COMPREHENSIVE STUDY REPORT

EXPLORATION DRILLING PROGRAM ON EL2407
BEPCO CANADA COMPANY

PREPARED BY

THE CANADA-NOVA SCOTIA
OFFSHORE PETROLEUM BOARD

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FOREWORD

Sections of the following document may have been reproduced in whole or in part during the preparation of this report:

> Jacques Whitford Environment Limited. Environmental Assessment Report to BEPCo Canada Company on Exploration Drilling on EL2407. July 19, 2004.
>
> Jacques Whitford Environment Limited. Addendum to Environmental Assessment Report on Exploration Drilling on EL2407. November 5, 2004.

EXECUTIVE SUMMARY

This Comprehensive Study Report (CSR) was prepared by the Canada-Nova Scotia Offshore Petroleum Board, as required by the *Canadian Environmental Assessment Act (CEAA*), to review the proposal by BEPCo. Canada Company (BEPCo) to commence exploratory drilling on EL 2407. This project is under review at the Comprehensive Study level because of the location of the project in relation to previously assessed offshore study areas. As such, the Canadian Environmental Assessment Agency is the Federal Environmental Assessment Coordinator for this project, while the CNSOPB is the Responsible Authority. Expert advice was provided by the Department of Fisheries and Oceans Canada and Environment Canada throughout the project. Consultation with the public was an important part of the scoping process, as well as during the preparation of this report.

The purpose of this CSR is to describe the project, the environmental setting, the potential project-specific environmental interactions, the proposed mitigation measures, and the significance of any adverse environmental effects. This review ensures that the environmental effects of BEPCo's proposed exploratory drilling program have been carefully considered before the CNSOPB takes action with respect to the exploratory drilling project. The results of this assessment must be considered before a final regulatory decision can be made.

BEPCo has proposed to drill as few as one or as many as six wells in total, including appraisal/delineation wells, on EL2407. This includes one to three deepwater wells between 2005 and 2007. The initial exploratory well will be a (+/-) 3200 m deepwater exploratory well in approximately 1,450 m of water. The first well will be drilled in mid 2005, subject to approval, and will take approximately 30 to 60 days to complete. Subject to drilling success, additional wells may also be drilled near this location to further determine the extent of the reservoir. BEPCo estimates that two appraisal wells may be drilled in 2008 and another well in 2009. All wells will be drilled in water depths greater than 1,200 m.

This Comprehensive Study focuses on Valued Ecosystem Components (VECs), as well as air emission issues, which were selected during the scoping and consultation processes. The following VECs were reviewed by the Board in the preparation of this CSR: marine benthos, marine fish, marine mammals, marine turtles, marine birds, special Areas (the Haddock Box), and other ocean users. Species at risk were considered within each respective VEC as required by the *Species at Risk Act (SARA)*. Additionally, the potential effects on air quality, the effects of the environment on the project, malfunctions and accidental events, and cumulative effects were evaluated.

The Canada-Nova Scotia Offshore Petroleum Board has considered the significance of the environmental effects of the project and has determined that, taking into account the implementation of identified mitigation measures, the project is not likely to result in significant adverse environmental effects. The potential adverse environmental effects on the VECs selected and assessed will be short term and localized, and can be effectively mitigated through the application of technically feasible mitigation measures, good oilfield practice, and existing regulatory requirements.

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LIST OF ABBREVIATIONS

ADW	Approval to Drill a Well
BEPCo	BEPCo Canada Company
BOP	Blowout Preventer
CEAA	*Canadian Environmental Assessment Act*
CEA Agency	Canadian Environmental Assessment Agency
CEPA	Canadian Environmental Protection Act
CMM	Confederacy of Mainland Mi'kmaq
CNSOPB	Canada – Nova Scotia Offshore Petroleum Board (the Board)
COSEWIC	Committee on the Status of Endangered Wildlife in Canada
CSR	Comprehensive Study Report
CWS	Canadian Wildlife Service
dB	decibel
DFO	Fisheries and Oceans Canada
DPA	Drilling Program Authorization
EA	Environmental Assessment
EAC	Ecology Action Centre
EC	Environment Canada
ECM	Environmental Compliance Monitoring
EEM	Environmental Effects Monitoring
EL	Exploration Licence
EMOBM	Enhanced Mineral Oil-based Mud
FA	Federal Authority
FAC	Fisheries Advisory Committee
GHG	Greenhouse Gases
Hp	Horsepower
HSE	Health, Safety and Environment
MARPOL	International Convention for the Prevention of Marine Pollution from Ships
MODU	Mobile Offshore Drilling Unit
MPA	Marine Protected Area
MSC	Meteorological Services of Canada
NAFO	Northwest Atlantic Fisheries Organization
NCNS	Native Council of Nova Scotia
NEB	National Energy Board
OBM	Oil-Based Muds
OCSG	Offshore Chemical Selection Guidelines
OWTG	Offshore Waste Treatment Guidelines
ppm	parts per million
psi	pound per square inch
RAs	Responsible Authorities
REET	Regional Environmental Emergencies Team
ROV	Remotely Operated Vehicle
SAR	Species at Risk
SARA	*Species at Risk Act*

SBM	Synthetic-based Mud
SOEP	Sable Offshore Energy Project
SPANS	Seafood Producers Association of Nova Scotia
SPM	Suspended Particulate Matter
UNSI	Union of Nova Scotia Indians
VEC	Valued Ecosystem Component
VSP	Vertical Seismic Profile
WBM	Water-based Mud
WWF	World Wildlife Fund

1.0 GENERAL INFORMATION

Project Name: BEPCo. Canada Company – Exploratory Drilling Program on Exploration Licence (EL) 2407.

Project Location: Approximately 200 km south-southeast of Halifax on the Scotian Slope. The approximate coordinates are Latitude: 43.5 degrees N; Longitude: 63.0 degrees W.

Purpose of the Project: To help evaluate the potential for hydrocarbon reserves on EL2407.

Project Proponent: BEPCo. Canada Company

Responsible Authority: Canada-Nova Scotia Offshore Petroleum Board (CNSOPB)

Environmental Assessment Triggers: Drilling Program Authorization in accordance with *Canada-Nova Scotia Offshore Petroleum Resources Accord Implementation Act* – paragraph 142(1)(b).

The project as proposed is described in Section 15 of the *Comprehensive Study List Regulations*.

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1.1 BACKGROUND

The Canada-Nova Scotia Offshore Petroleum Board (the CNSOPB) is the responsible authority for exploratory drilling projects in the Nova Scotia Offshore Area as defined in the *Canada-Nova Scotia Offshore Petroleum Resources Accord Implementation Act* (Accord Acts). In accordance with the *Canadian Environmental Assessment Act* (the CEAA), BEPCo Canada Company (BEPCo) submitted a project description to the CNSOPB on April 28, 2004. The project described is an exploratory drilling program within Exploration Licence 2407.

Upon receipt of the project description the CNSOPB declared itself a responsible authority because the project cannot proceed without an authorization under sub-section 142 (1) (b) of the Accord Acts. Issuance of the authorization is described in the *Law List Regulations* of the CEAA.

Following the requirements of the *Regulations Respecting the Coordination by Federal Authorities of the Environmental Assessment Procedures and Requirements*, the project description was distributed to the following to determine their role in the assessment: Industry Canada, Health Canada, National Energy Board, Environment Canada, Transport Canada, Department of National Defense, Human Resources Development Canada, and the

Department of Fisheries and Oceans. Their responses indicated that there are no other responsible authorities for this project. Environment Canada (EC) and the Department of Fisheries and Oceans (DFO) both indicated they possess specialist knowledge and information which should be considered in the assessment of the proposed undertaking.

In accordance with the CEAA, the Canadian Environmental Assessment Agency (the Agency) is the Federal Environmental Assessment Coordinator for the project, as the project is described in the *Comprehensive Study List Regulations*. The Agency established a federal environmental assessment committee for the BEPCo project. Committee members include a representative each from the Agency (chair), the CNSOPB, EC and the DFO.

As part of the assessment process, the CNSOPB (as responsible authority) must provide opportunities for public participation throughout the comprehensive study. Consultation with the public is available at three stages of a comprehensive study: during the preparation of the scope of Environmental Assessment, during the preparation of the comprehensive study, and while the Minister of the Environment is reviewing the completed Comprehensive Study Report (CSR).

The public had 21 days to provide written comment on the draft Scoping Document, and approximately four weeks to submit written comments on the EA Report prepared by the proponent. The public will also have a period (to be determined by the Agency) to examine this CSR, prior to the Minister's decision.

The CNSOPB prepared a report, commonly referred to as the 'track report', required by subsection 21 (2) of the CEAA for submission to the Minister of the Environment. This report provided the basis for the Minister's decision to refer the project back to the CNSOPB to continue environmental assessment by means of a comprehensive study, or refer the project to a mediator or review panel. The report describes and discusses the scope of the project; the factors to be considered in its assessment; public concerns in relation to the project; the potential of the project to cause adverse environmental effects; and the ability of the comprehensive study to address issues relating to the project. The public comments on the draft scoping document were taken into account during the preparation of the track report and during the Minister's consideration of the report. The track report was submitted to the Minister of the Environment on July 8, 2004 and on July 16, the Minister released his decision to continue with the comprehensive study.

The CNSOPB delegated the preparation of a technical Environmental Assessment Report to the proponent. On July 20th, 2004 BEPCo submitted the "Environmental Assessment Report on Exploration Drilling on EL 2407". The report was released to the public on August 12th. Written public comments on the EA were requested by September 10. Participant funding was made available from the Agency to assist the public to participate in the comprehensive study. Funding was provided to the Ecology Action Centre and to the Netukulimkewe'l Commission. Comments from expert federal departments and the public on the environmental assessment report were reviewed and considered by the CNSOPB. All comments were forwarded to BEPCo and it was requested to respond to all comments specifically related to the EA. BEPCo submitted an addendum to the environmental assessment, on November 5th, 2004, responding to the comments.

The Environmental Assessment Report, the Addendum to the Report, public comments, and advice received from Environment Canada and the Department of Fisheries and

Oceans were considered upon during the preparation of this Comprehensive Study Report. All documents used in the preparation of this CSR are in the Canadian Environmental Assessment Registry for the project, and available on line at the CNSOPB's web site (www.cnsopb.ns.ca).

1.2 PURPOSE OF THIS COMPREHENSIVE STUDY REPORT

Projects described in the *Comprehensive Study List Regulations* of the CEAA are required to undergo a comprehensive study level environmental assessment. In accordance with section 15 of the *Comprehensive Study List Regulations*, BEPCo's proposed exploratory drilling project is located outside the limits of a study area delineated in an environmental assessment of a project for the exploratory drilling for, or production of, oil or gas in an offshore location that was conducted by a review panel or as a comprehensive study under the CEAA or by a panel under the Environmental Assessment Review Process Guidelines Order.

Therefore, the environmental assessment of BEPCo's proposed exploratory drilling project requires a comprehensive study, as it is a drilling program in an area not previously assessed by a process as described above.

The Comprehensive Study promotes communication and coordination between federal authorities, and ensures that there is an opportunity for public participation in the environmental assessment process. In addition, projects undergoing a comprehensive study must include a consideration of alternative means of carrying out the project. Comprehensive studies must also consider the need for, and the requirements of any follow-up program in respect of the project.

The purpose of this Comprehensive Study Report is to describe the project, the environmental setting, the potential project-environment interactions, the proposed mitigation measures and the significance of any adverse environmental effects to ensure that the environmental effects of BEPCo's proposed exploratory drilling program have been carefully considered before the CNSOPB takes action regarding the exploratory drilling project. The results of this assessment must be considered before final regulatory decisions are made on the activity.

This Comprehensive Study Report is submitted to the Minister of the Environment and to the CEA Agency. The Minister will issue an environmental assessment decision statement following his review which may include additional requirements for mitigation measures or a follow-up program. The minister can also request additional information or direct that public concerns be addressed prior to issuing a decision on the CSR.

1.3 NEED FOR THE PROJECT

BEPCo's proposed exploratory drilling project on EL2407 is required to evaluate the potential for hydrocarbon reserves within the exploration licence.

2.0 PROJECT DESCRIPTION

2.1 PROJECT OVERVIEW

The proposed exploratory drilling activity will occur in waters under the jurisdiction of the CNSOPB on EL 2407, located approximately 200 km south-southeast from Halifax, on the Scotian Slope, as illustrated in Figure 2.1. BEPCo, the proponent, is proposing a multi-year, multi-well drilling program. It is anticipated that one exploration well will be drilled per year between 2005 and 2007. If significant oil or gas reserves are discovered, this may be followed by drilling delineation/appraisal wells and/or pre-development drilling to determine the extent of the reservoir. Two appraisal wells may be drilled in 2008 and a third well may be drilled in 2009. Also, the proponent may conduct two Vertical Seismic Profiles during the drilling of each well.

Specific well locations have not been determined; however, the areas of interest are located in the deep water portion of the exploration licence, in water depths greater than 1,200 meters. BEPCo initially proposes to drill a (+/-) 3,200m exploratory well in a water depth of approximately 1,450 metres. The approximate location of this well is 42^{o} 39’ 20”N and 63^{o} 04’ 34”W. Additional wells to delineate, exploit, and develop the prospective area may also be drilled near this location.

For its exploration drilling program on EL2407, BEPCo will use a mobile offshore drilling unit (MODU) that may be dynamically-positioned or moored. This MODU may be either a drillship or a semi-submersible drilling unit.

It is anticipated that there could be as few as one or as many as six wells in total, based on drilling success. It is currently estimated that the first well will take approximately 30 to 60 days to drill/complete. Deeper wells drilled within the licence may take up to 90 days to drill/complete. A goal of the project is to undertake drilling activities during the summer months; however, based on business needs and opportunities, drilling may take place during the more adverse winter months. This assessment therefore addresses the potential effects of drilling throughout the year.

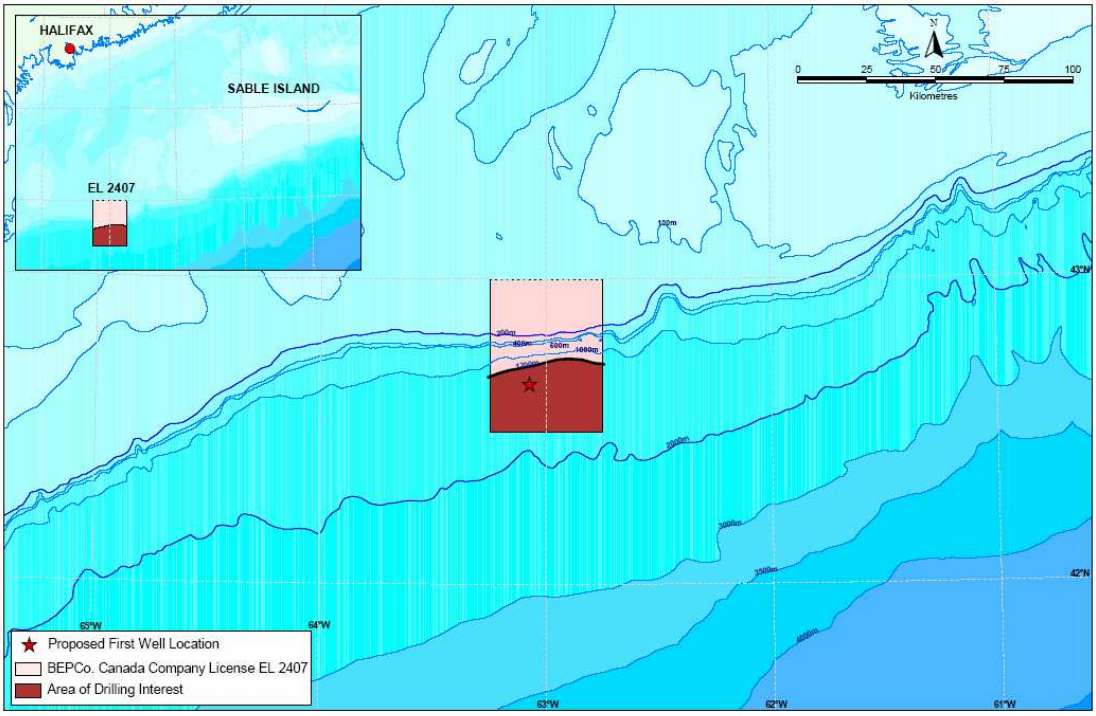

FIGURE 2.1: LOCATION OF THE PROJECT

In summary, the proposed project could consist of drilling a maximum of six wells over a five year period.

2.2 PROJECT EQUIPMENT

The following description of program components addresses the range of options that may be used throughout the proposed five year drilling program.

2.2.1 DRILLSHIP

Drillships are generally used to drill in deeper water. Drillships have a series of thrusters or powered propellers fore and aft and on both sides of the vessel. A computerized system automatically activates the thrusters to maintain the vessel in a relatively constant position. Because deepwater drillships (and semi-submersibles) do not need to be attached to the bottom, they can drill in water depths greater than 3,000m.

2.2.2 SEMI-SUBMERSIBLE DRILLING UNIT

A semi-submersible rig consists of two longitudinal and streamlined lower hulls that support several vertical cylinders or columns, which in turn support the main deck of the rig. Once on site, the hulls and columns are filled with water so that the rig partially submerges; the main deck is above water and the hulls are below the water surface. Because much of

the mass is well below the waterline, semi-submersibles are quite stable in rough seas.

The drilling unit may either be moored to the bottom with a series of 6 to 12 anchors or use a dynamic positioning system to maintain position. For ultra-deepwater locations, typically deeper than 2000m, semi-submersibles rely solely on dynamic positioning to keep on station.

2.2.3 SUPPLY & SERVICING

Regardless of the type of drilling unit employed, supply vessels and helicopters will be used to supply personnel, fuel, food, drilling equipment, and other materials required to maintain a crew, vessel, and drilling operations. Supply vessels and helicopters will also be used for regular crew changes.

2.2.3.1 SUPPORT VESSELS

Supply vessels (workboats) will supply the drilling rig with various equipment necessary for drilling operations. The vessels will make periodic round trips from a shorebase to the drilling unit (approximately three round trips per week) originating from various harbours along the coast of Nova Scotia. Plans are to use Halifax Harbour for the initial exploratory drilling, but logistics support could originate from locations south of Halifax. In addition, regulations administered by the CNSOPB require a designated standby vessel at the rig at all times.

Due to the expected servicing needs, BEPCo will likely employ three supply vessels during the drilling operation. Most likely, all of these boats will be capable and certified to act as standby vessels. At least one of these boats will be near the rig at all times acting in a standby capacity.

2.2.3.2 HELICOPTERS

Personnel will be transported to and from the rig via helicopters with flights approximately three times per week. In some cases, helicopters will also transport small equipment and parts. The two aircraft types that are likely to be employed for this project are the S-61 and S-76.

2.2.4 SAFETY ZONE

All other vessel traffic will be prohibited from an area around the rig as a safety precaution during drilling operations (i.e., ~ 30 to 90 days), as per regulations administered by the CNSOPB. The safety zone will be either the area within a 500m radius of the rig or, if the rig is anchored, a zone drawn at 50m from the anchor pattern, whichever area is greater. Notices to Mariners will be issued to ensure effective communication with other mariners regarding project vessels, equipment and activities. In addition, BEPCo will communicate directly with commercial fishing representatives

to inform these groups of the planned dates and locations of rig movements and drilling activities, prior to beginning the drilling program.

2.3 DESCRIPTION OF DRILLING ACTIVITIES

2.3.1 WELL DRILLING

BEPCo will follow a standard procedure for deepwater drilling projects. Typicallly, wells are drilled starting with a conductor hole section drilled to reach a depth of approximately 80m below the seafloor, followed by the surface hole section drilled to approximately 1,000m below the seafloor. Once a section of the hole is drilled, the drill string is pulled out and steel pipe, called casing, is inserted and cemented in place to prevent the wall of the hole from caving in and the seepage of mud and other fluids into the hole, while drilling the next section. The conductor casing provides a foundation for subsequent casing strings while the surface casing provides formation integrity to facilitate well control while drilling the next hole section.

Seawater and water-based mud (WBM) are used to drill these sections of the well. Since there is no way to return the mud to the MODU before the first two casings are installed, the drilling mud and cuttings (broken rock) are released onto the seabed.

After cementing the surface casing, the blowout preventer (BOP) is installed and a drilling riser is run to connect the casing set at the seafloor up to the drilling unit. This provides a conduit for return of cuttings and drilling mud to the MODU, where processing of the mud and cuttings takes place. The remaining intervals may be drilled with WBM or synthetic-based muds (SBM). Section 2.4.1 of the proponent's EA provides additional information on drilling muds and cuttings.

On the first proposed well of BEPCo's program, the next hole section is planned to be drilled to the anticipated total depth of 3,200m below the seafloor. An intermediate casing string may be installed, should the need arise. On deeper wells, the intermediate casing string will likely be set prior to reaching total depth to ensure adequate pressure integrity to reach subsequent casing setting depths. A typical deep well may reach a depth of 4000m. The size, depth, and number of intermediate casing strings may vary according to expected formation depths and pressures. The final casing plan is included in the drilling plan, which is provided to the CNSOPB for review and approval prior to any authorization to drill a well.

If significant quantities of hydrocarbons are found, a production casing may be installed and cemented into place. The well will then be secured in accordance with the *Nova Scotia Offshore Petroleum Drilling Regulations* administered by the CNSOPB, pending further geologic interpretation of the results.

2.3.2 VERTICAL SEISMIC PROFILE

BEPCo may potentially conduct two Vertical Seismic Profiles (VSP's) during the drilling of each proposed exploration well.

Presently, BEPCo only intends to record a Zero Offset VSP program at each of the exploration drill sites. However, the CSR also assesses the potential impact of a concurrent Walkaway VSP, should it be required. If a Walkaway survey is necessary, it is estimated that each would take place within a radius of 2.5 km from each well site.

2.3.2.1 ZERO OFFSET VERTICAL SEISMIC PROFILE

Using a Vertical Seismic Imaging Tool (VSI) run in an exploration well, a series of geophones are anchored in the wellbore at regular intervals to cover the entire recording depth. An acoustic source array similar to the array described below is deployed over the side of the MODU to a depth below the ocean surface of approximately four metres.

At each anchoring of the VSI toolstring in the wellbore, the acoustic source is triggered approximately 5 times to create a sonic wave that is recorded by the VSI geophones anchored in the wellbore. The sonic wave, recorded by the geophones, is digitized and transmitted to the surface recording equipment.

This operation may be conducted twice, once at the end of the shallow open hole section, and subsequently at the final total drilling depth.

2.3.2.2 VSP SONIC SOURCE

The VSP sonic source could consist of an acoustic airgun array made up of 4 x 40 in^3 and 4 x 150 in^3 acoustic sources, pressured up to 2000 psi. The acoustic source array provides calibrated peak vertical amplitude of 13.4 bar @ 1 m (i.e. a sound pressure level of 242.5 dB re 1-micro Pa @ 1 m).

2.3.2.3 WALKAWAY VERTICAL SEISMIC PROFILE

Although not presently planned, a Walkaway VSP may be conducted using the same VSI toolstring. This would involve anchoring the VSI toolstring at different depths, successively, within each wellbore (as with the Zero Offset VSP). An acoustic source array would then be deployed from a workboat to a depth of approximately four metres.

For each anchoring, the workboat would navigate away from the MODU in a straight line, for a distance of approximately 2.5 kilometres. This would be repeated in two directions away from the MODU. While the workboat transits along these lines, the

acoustic source array is triggered regularly to create a sonic wave that is recorded by the VSI geophones anchored in the wellbores. The sonic waves recorded by each of the downhole geophones is digitized and transmitted to the surface recording equipment.

2.3.2.4 TIMING

Two Zero Offset VSP's may be conducted, one at the end of the shallow open hole section and the other at the final drilling depth. Should a Walkaway VSP be conducted, it would occur simultaneously with the last Zero Offset VSP at the total depth of each wellbore. The two acoustic source arrays are triggered alternatively, never at the same time, during the recording process.

The expected time of data acquisition (with an active sonic source) for each VSP (Zero Offset and potential Walkaway) is less than nine hours. The total time of each VSP (Zero Offset and potential Walkaway) is expected to be less than 15 hours.

2.3.3 WELL TESTING

Once an exploration well has been drilled to depth, through the prospective reservoir, well testing may occur depending on the hydrocarbons encountered. The decision whether or not to test the reservoir is made based on an evaluation of the geological formation and fluid properties.

Typically, during well testing operations, a short string of casing called a liner is cemented into place in the reservoir to both ensure the hole remains open and provide a conduit for setting and sealing well test tools. Controlled explosive charges are used to perforate this linear at a specified zone within the reservoir to allow reservoir fluids to enter the wellbore. These reservoir fluids are allowed to flow to the MODU in a controlled manner and the flow of fluids is measured. These fluids may contain hydrocarbons and/or water, which is often contained in oil and gas formations. Produced hydrocarbons will be separated from produced water on the rig. Hydrocarbons and small amounts of produced (formation) water are flared using high-efficiency igniters to ensure relatively complete combustion of hydrocarbons and to minimize emissions.

Even if a reservoir is encountered and it contains hydrocarbons that are thought to be commercial, well testing may not be carried out immediately. Instead, the well may be temporarily suspended with a drilling rig returning at a later date to test the well.

2.3.4 WELL ABANDONMENT

All wells will be abandoned following the completion of drilling and any well testing activities. Well abandonment procedures will follow industry standard practices, in accordance with the *Nova Scotia Offshore Petroleum Drilling Regulations* which are administered by the CNSOPB.

The abandonment process for a well consists of placing mechanical and cement plugs at strategic depths in the wellbore to separate and permanently seal off various zones. This process isolates these zones from each other and prevents the escape of any fluids (including oil, natural gas and brine) from the wellbore.

The final abandonment process in shallow water consists of cutting the conductor and surface casing about three metres below the seabed and recovering the wellhead and short length of casing. This process removes any possible obstruction for subsequent fishing or other activity. BEPCo intends to seek approval from the CNSOPB to leave the wellhead itself on the seabed, as the water depths at the proposed drilling location should preclude this small protrusion rising some three to four metres above the seabed, from being a hazard to fishing or other marine activities.

3.0 PROJECT ALTERNATIVES

Section 16(1)(e) of the CEAA provides the ability for RAs to consider other relevant matters, such as alternatives to the project. Also, section 16 (2)(b) of the CEAA specifies that every comprehensive study of a project shall include consideration of alternative means of carrying out the project that are technically and economically feasible and the potential environmental effects of any such alternative means.

3.1 ALTERNATIVES TO THE PROJECT

Alternatives to the Project are defined as functionally different ways of achieving the same end (CEA Agency 1997). There is no viable alternative to exploration drilling since potential for reservoirs can only be precisely determined through ground-truthing (*i.e.,* exploration drilling).

3.2 ALTERNATIVE MEANS OF CARRYING OUT THE PROJECT

Alternative means of carrying out the project are defined as methods of similar technical character or methods that are functionally the same (CEA Agency 1997). Alternative means of exploration drilling include considerations related to drilling equipment (*i.e.*, semi-submersible drilling unit or drillship), methods of station keeping (*i.e.*, mooring or dynamic positioning), number of wells, well diameter design, type of drilling fluids (*i.e.*, WBM or SBM), and management of discharges.

Due to the water depths over this licence, drillships or semi-submersible rigs are the only viable types of drilling units for the project. Dynamically-positioned and moored drilling rigs or vessels will be considered subject to water depth, environmental limitations and availability of MODUs. The availability of drillships around the world is higher than that of semi-submersible rigs. The cost of mobilization for a one well project will be substantially less for a drillship. BEPCo's preference is to select a drillship, which assumes that the well can be spudded in the late spring or summer months when drillships can operate in the North Atlantic.

The proposed project could consist of drilling a maximum of six wells over a five year period. The final number of wells drilled is based on the success of any previous well drilled on the exploration licence. If significant hydrocarbons are discovered, this may be followed by drilling delineation/appraisal wells and/or pre-development drilling to determine the extent of the reservoir. The proponent will only drill the minimum number of wells that are required to determine the existence of hydrocarbons and the extent of the reservoir. Therefore, it is not technically feasible to reduce the number of wells.

The CNSOPB considered opportunities to decrease well diameter or the setting depth of casing strings, which would decrease the volume of cuttings produced and discharged. Operationally, it is preferable to drill as small a diameter hole as possible, as the rate of drilling is much faster for a smaller hole. The diameter and length of the wellbore in the larger diameter upper sections of the well are determined by the casing program design. The length and diameter of the surface casing is critical, both for safety (as the blowout preventers are attached to this casing), and to achieve the objective depth of the well. Detailed casing designs and setting depths will be submitted to the CNSOPB as part of the Authority to Drill for each well. The CNSOPB will review these to ensure that the minimum wellbore diameter and length is used that can safely achieve the objectives of the well.

Unless there is a technical need to use SBM, BEPCo plans to use WBM to drill all wells. WBM is less expensive and easier to handle. Depending on the depth of the wells drilled, the predicted geological and reservoir characteristics, SBM may be required due to reactive formations or fluid properties at higher mud weights or temperatures. At this early stage of the project, it is not possible to design the required drilling mud system, thus the use of SBMs has been assessed.

The Offshore Waste Treatment Guidelines, 2002 (OWTG) are intended to be the minimum standard that will be applied in making decisions related to waste treatment, disposal and monitoring. BEPCo will meet all the established criteria and guidelines for discharge. The current regulatory limit for discharge of oil on cuttings is 6.9%. The CNSOPB consistently reviews new proposed processes for the reduction of this limit, and encourages BEPCo to seek solutions to reduce the volume of SBM discharged.

The WBM system that is planned to be used will meet the guidelines for discharge. An alternative is to ship the WBM back to shore, however the cost, the short shelf life of the system, and the low level of drilling activity in the region make the reclamation and reuse of these systems impractical.

Another alternative to disposal of cuttings and muds that has had success is re-injection into sub-sea formations. This process has been successful in cases where there are dedicated re-injection wells in development projects. It would not be prudent to specify re-injection as preferred option for exploration wells; as the geology may not be acceptable for containment of the injected material, there may simply be too many unknowns regarding geology and rock strengths, and there are concerns of causing future drilling, evaluation or production problems due to damaging the reservoir. It is generally not technically viable to re-inject cuttings and mud at a single well exploratory site, especially from a floating drilling unit.

The basic mud system that is planned to be used will be tested and the individual components tested and screened to meet the Offshore Chemical Selection Guidelines.

Drilling fluid companies continue searching for new products that will reduce toxicity levels while effectively performing the intended drilling function.

In some circumstances chlorine has been used as a biocide in the cooling water from the MODU, as recognized in the OWTG. Since a MODU has not yet been selected for the project, it is unknown whether a biocide will be used; and if so, whether chlorine or an alternative will be proposed. If the use of a biocide is proposed, it will be reviewed as part of the Drilling Program Authorization.

As BEPCo and other deepwater operators off Nova Scotia and elsewhere continue to develop new drilling technologies or expand existing ones, other acceptable alternatives may be identified. However, this is unlikely over the next five years. With CNSOPB approval, BEPCo has committed to choose the alternatives that maximize project efficiency, while minimizing the effect on the environment. These proposed alternatives will be submitted to the CNSOPB for review and approval. During this process, the EA will also be reviewed to ensure its validity for the suggested alternative means and to determine any potential environmental implications or if additional mitigation is needed.

4.0 SCOPE OF THE PROJECT AND ASSESSMENT

Based on the information contained in the project description the CNSOPB prepared a scoping document entitled "BEPCo Canada Company Exploratory Drilling Program on Exploration Licence 2407". The scoping document is included in Appendix A and is also available on the CNSOPB website (www.cnsopb.ns.ca) under the Environment section in the Public Registry or from the CNSOPB office. The scoping document directs the preparation of the comprehensive study to determine whether or not the project is likely to cause significant adverse environmental effects. In developing the scoping document, the CNSOPB consulted with the Canadian Environmental Assessment Agency, Department of Fisheries and Oceans, Environment Canada, fisheries groups and the public.

The scope of the assessment includes a consideration of factors set out under subsection 16(1) and 16(2) of the CEAA. The scope of the proposed project was determined to include drilling a maximum of six wells over a five year period on EL 2407. Also, the proponent may conduct two Vertical Seismic Profiles (VSPs) during the drilling of each well.

The proponent was directed to consider the potential effects of the project on Valued Ecosystem Components (VECs) within appropriate spatial and temporal boundaries, which were to be defined and rationalized. Potential issues specifically referenced in the scoping document include the need to consider marine resources, marine use, discharges and emissions, the effects of the environment on the project, accidental events, cumulative environmental effects and follow-up and monitoring.

Seven Valued Ecosystem Components (VECs), as well as air emission issues, have been identified through the scoping process and consultation findings. The VECs considered are: marine benthos, marine fish, marine mammals, marine turtles, marine birds, special areas (the Haddock Box), and other ocean users.

5.0 PROJECT STUDY AREA

The project study area includes the limits of the exploration licence (Figure 2.1), as well as the zones of influence of various project interactions, as they extend beyond the limits of the licence.

The CEA Agency's Operational Policy Statement (OPS) entitled "The Process for Defining the Spatial Boundary of a Study Area During an Environmental Assessment of Offshore Exploratory Drilling Projects" (CEA Agency 2003) describes the process for defining a study area. As stated in this OPS, defining a study area requires professional judgment and consideration of:

- the cause-effect relationships between project components or actions (including a recognition of the defined risk of malfunctions or accidents) and Valued Ecosystem Components (VECs), (where VECs are components of the receiving environment and could include ecological units or regions, or areas with a special designation such as a marine protected area); and
- the location at which the potential for the environmental effects, including cumulative effects, becomes insignificant (the boundary of a VEC area).

It further states that the study area should be a composite of all the VEC areas.

The results of trajectory modeling indicated that the greatest physical extent of this project's effects would be as a result of an accidental 100 barrel batch diesel spill event, which, in a worst-case scenario could travel 37 km from the area of interest before reaching a level of 0.1 ppm. Other project-related effects would affect a physical area much smaller than the area defined by an accidental event; the exception to this is a surface release of WBM, which can extend 15-300 km from the site. At these distances, the resulting level of SPM is within the range of background levels. For these reasons, the study area only considers the zone of influence from the release of muds and cuttings (*i.e.,* within 800 m of each well site) with potential for smothering and alteration of benthic habitat.

It is also necessary to consider the spatial boundaries for the VECs, as related to ecological units or areas with special designation. This acknowledges the need to consider how project effects may extend beyond the boundaries of the zones of influence due to the spatial ecological boundaries of the VECs being considered. For this project, an example is the Haddock Box. Although the potential zone of influence of an accidental event extends over only a small portion of the Haddock Box, it is appropriate to consider how this event would affect this special area as a whole.

For many VECs, such as marine mammals, marine birds, marine fish and marine turtles, it is a challenge to define the exact spatial boundary for these transboundary VECs. Within each of these VECs, there are various listed-species, many of the species are described in terms of Scotian Shelf and Slope presence (temporally and spatially), and in many cases there are data gaps related to exact distribution and numbers. In describing the existing conditions for these VECs, it is necessary to consider the data available for these populations across the Scotian Shelf and Slope. It is also possible that for migratory species, and in consideration of potential cumulative effects, project effects could be felt over a broader area than that defined by the zones of influence of the project.

The need to increase the study area to consider population effects is tempered by published data and professional judgment regarding the location at which the potential for the environmental effects, including cumulative effects, becomes insignificant. There is a high level of certainty regarding the potential effects of offshore drilling activities, as has been demonstrated globally in the published literature and most recently reiterated at the DFO workshop on oil and gas effects monitoring (Armsworthy et al., 2005).

The study area was also chosen to consider the potential effects of the project on commercial fisheries. Other ocean users are a VEC for this assessment and include commercial fishing activity. The project has the potential to create loss of access within the exclusion zone or due to an accidental event. The project, in a worst-case scenario, has the potential to affect a large portion of

fishing efforts within 4Wl; therefore it was considered appropriate to include this unit within the study area in its entirety. As the project has the potential to affect a much smaller percentage of fishing activity in the other two units, a smaller portion of these units was included within the study area.

There is potential for effects on individuals and populations to extend beyond the physical limits of the spill, but it is difficult to map this with certainty. In this case, the precautionary approach is to have a sufficiently large area to study. For ease of reference, major latitude and longitude coordinates were selected, as has been the accepted method for the environmental assessments of development projects offshore Nova Scotia.

The results of the above considerations defined the study area as shown in Figure 5.1

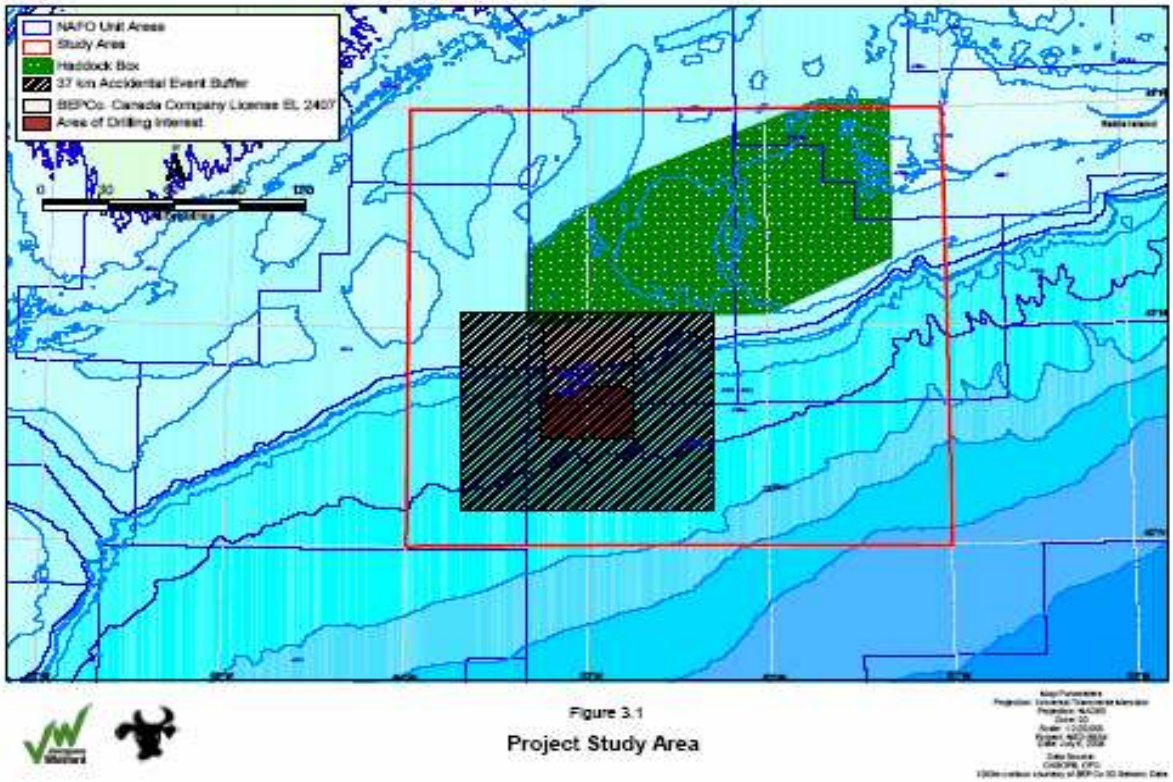

FIGURE 5.1 PROJECT STUDY AREA

6.0 CONSULTATION AND PUBLIC PARTICIPATION

The public is provided with opportunities to participate in the environmental assessment during three distinct stages of the Comprehensive Study process; during the preparation of the scope of the environmental assessment, while conducting the Comprehensive Study, and during the comment period administered by the CEA Agency on the completed CSR.

In addition to listing the project on the Canadian Environmental Assessment Registry (reference number 04-03-2712), the CNSOPB listed the project on its own Public Registry which is located on its website, www.cnsopb.ns.ca, under the environment section. All documents related to the environmental review of the project are listed and those relating to the public consultation are available electronically or by contacting the CNSOPB office.

6.1 SCOPING DOCUMENT

The CNSOPB actively sought public comment on the draft scoping document in May and June of 2004. It published a notice in eight provincial and community newspapers explaining the process and providing details of how the public could submit comments. In addition, the CNSOPB issued a news release which was picked up by print and broadcast media outlets around the province. The news release was also posted electronically to the CNSOPB website with links to electronic copies of the Project Description and draft Scoping Document. The public was invited to contact the CNSOPB's office for a printed copy if they did not have access to the website. The CNSOPB received submissions from the South West Nova Environmental Protection Group, the Native Council of Nova Scotia, and a concerned member of the public.

Also, the CNSOPB requested input from its Fisheries Advisory Committee (FAC), which is comprised of representatives of the fisheries sector from across the province (including aboriginal groups), as well as representatives from the federal and provincial government fishery departments. Oral comments and one written comment were received from the FAC.

Comments and advice was also received from Environment Canada, the Department of Fisheries and Oceans, and the Canadian Environmental Assessment Agency throughout the comprehensive study process.

The CNSOPB responded in writing to acknowledge receipt of all comments and considered all comments as it finalized the Scoping Document and prepared the track report for the Minister of the Environment.

In addition to the public comments requested by the CNSOPB, BEPCo undertook a stakeholder consultation program focused primarily on the commercial fisheries, including Aboriginal organizations. The purpose of the program was to ensure early stakeholder notification of the project, provide accurate information on the project activities, gather information on fishing activities in the project area, and solicit comments and concerns regarding potential interactions with the project.

BEPCo contacted aboriginal organizations regarding current and planned fishing activities in the Project area. Because of the involvement of these Aboriginal groups in these fisheries, the Confederacy of Mainland Mi'kmaq (CMM), the Union of Nova Scotia

Indians (UNSI), and the Native Council of Nova Scotia (NCNS) were approached. A meeting was held with the NCNS to discuss the Project and the EA process. Information was provided on their current and planned fisheries, which was included in BEPCo's EA Report. Fisheries information was not available from First Nations that were represented by CMM and the UNSI. BEPCo met with the CMM/UNSI Technical Committee and discussed the results of the EA report. Also, BEPCo will be having further discussions with these organizations regarding active aboriginal fisheries once project timelines are confirmed.

6.2 ENVIRONMENTAL ASSESSMENT

The second round of public consultation took place in August and September of 2004. After the proponent submitted its Environmental Assessment report, it was posted electronically to the CNSOPB Public Registry. In addition, notices were placed in eight provincial and community newspapers inviting the public to submit written comments on the EA report. The notice appeared in The Daily News, The Chronicle-Herald, The Cape Breton Post, The Inverness Oran, The Bridgewater Bulletin, Le Courrier de la Nouvelle Ecosse, The Shelburne Coast Guard, and The Yarmouth Vanguard. The CNSOPB also issued a news release which was picked up by broadcast and print media around the province. The public was given 30-days to submit comments. Submissions were received from four groups; the Ecology Action Centre, the Seafood Producers Association of Nova Scotia, the World Wildlife Fund of Canada, and the Netukulimkewe'l Commission.

The CNSOPB responded in writing to all public submissions. Also, the CNSOPB forwarded the public comments, as well as comments from EC, DFO and CEAA, to BEPCo and directed them to provide responses to the comments. BEPCo. submitted an addendum to the EA, titled "Addendum to Environmental Assessment Report, Exploratory Drilling on EL2407, November 2004" which provided supplementary information to the original EA report and responses to all comments. In preparing this CSR the CNSOPB has considered all comments submitted as well as the proponents EA report and addendum.

Public comments received have been summarized and are presented in a consolidated table format in Appendix B. The CNSOPB's position is also presented in the Table. Broad statements on the state of knowledge and observations from reviews of other studies were considered in the CNSOPB's preparation of the CSR, but have not been included in the table. The public comments have been grouped into 21 topics. Many of the comments could be placed under several topics; however, in the table comments were only listed in one category and not repeated in others to avoid duplication.

All submissions received from the public are available in the Canadian Environmental Assessment Registry (CEAR), as well as on the CNSOPB web site (www.cnsopb.ns.ca).

6.3 MINISTERIAL REVIEW

The public has its final opportunity to comment after the Comprehensive Study Report is submitted to the Minister of the Environment for review. At that time, the CEA Agency invites public comment on the report, its conclusions, recommendations, or any other aspect. The Minister will take the public comments into consideration when making a decision on the project.

7.0 DESCRIPTION OF THE ENVIRONMENT

The following description of the environment is based on the EA submitted by BEPCo, as well as comments, advice and recommendations received from DFO and EC, which are expert departments for the environmental review of this project.

7.1 PHYSICAL ENVIRONMENT

Exploration Licence 2407 is located 200 kilometres south-southeast of Halifax and is 41 kilometres wide and 56 kilometres long covering approximately 2,300 square kilometres or 227,200 hectares. The licence straddles the Scotian Shelf and Slope with water depths ranging from 100 metres on the continental shelf to approximately 1800 metres on the Slope. The approximate location of the first well is Latitude 42º 39' 19" and Longitude 63º 04' 33". Subject to drilling success, additional wells may also be drilled near this location to further determine the extent of the reservoir. The proponent proposes that up to six wells may be drilled, all in water depths greater than 1,200 metres

The following physical environmental conditions were considered.

7.1.1 FOG

According to the Meteorological Service of Canada, fog conditions with visibility of less than one kilometre are reported 35% of the days annually. July is the peak month with fog reported on average 71% of days. (Environment Canada, 1993). Fog can affect drilling principally by limiting the operation of helicopters, but can also affect other activities.

7.1.2 WIND, WAVE AND CURRENT CONDITIONS

Significant wave height (average of the highest third of the waves during the time of observation) varies from an average of 1.4m in July and August up to an average of 3m in the months of December, January, and February. This is based on the AES40 40-year wind and wave hindcast, from 1958 to 1997. The highest monthly significant wave height is over 10m from October to April, with a hindcast of near 14m once as early as October and once as late as March.

Severe waves can also occur in tropical cyclones or hurricanes which track over the Scotian Shelf a couple of times a year between June and November. The Lahave Bank Buoy, a moored weather buoy about 100 km west-southwest of the proposed site, recorded a significant wave height of 12m and a corresponding spectral peak wave period of 17 seconds during Hurricane Juan, in September 2003. On rare occasions, moored buoys to the east of the area of interest have reported significant wave heights of 16m in tropical cyclones.

For the 1-hr mean winds at 10m, the monthly average wind speeds vary from 17 km/hr (4.8 m/s) in July to 35 km/hr (9.8 m/s) in January. The highest 1-hr mean winds of 103 km/h (28.5 m/s) were hindcast in December. The highest winds are not just restricted to the winter months, but can occur during hurricane season as well. Highest 1-hr mean wind speeds at 10m exceeded 83 km/hr (23 m/s) in each of the months from August to April. In August, the highest hindcast winds were 95

km/hr (26.3 m/s). Maximum wind speeds based on a shorter averaging period would be higher than the hourly values.

Currents over the Scotian Shelf break and Slope are complex. Current data show strong tidal oscillations in the upper part of the water column and weaker currents below, which is consistent with general theory. Mean currents, although not strong, are generally directed to the South-West. Surface means are weak over deep waters and may be reversed by wind or other effects on occasion.

7.1.3 ICEBERG AND SEA ICE IMPACTS

No icebergs have been reported within the study area and none are anticipated during the exploration drilling activity. Pack ice is also unlikely to reach the drilling area. However, BEPCo states in its EA it will develop contingency plans for sea ice as part of its Emergency Response Plan.

7.1.4 SUPERSTRUCTURE ICING

Superstructure icing is probable in the area from November through April. There are a several factors which may contribute to superstructure icing. For example, saltwater spray freezes on facilities and structures when the air temperature is below -1.8 ^{o}C, the water temperature is below 6^{o} C, and wind speeds are generally greater than 36 kilometres per hour. Other factors contributing to freezing spray are wave heights and the type of vessel or structure. Freezing precipitation can also contribute to superstructure icing, and can also hamper operations. (Environment Canada – Atlantic Region, 1989)

7.1.5 CLIMATE CHANGE

Climate change is not likely to influence the drilling activities given the short-term temporal scope of the project.

7.1.6 SEAFLOOR ACTIVITY

The seafloor within the project area is mainly silt, clay and sand and considered stable. This is not likely to affect the operation of the drilling activity.

7.2 BIOLOGICAL ENVIRONMENT

Seven Valued Ecosystem Components (VECs) have been identified by the proponent in consultation with the responsible authority and expert departments. Species at risk were considered within each applicable VEC and as required by the *Species at Risk Act* (SARA). VECs are:

- Marine Benthos;
- Marine Fish;
- Marine Mammals;
- Marine Turtles;
- Marine Birds;
- Special Areas (the Haddock Box); and
- Other Ocean Users.

The following sections provide information on the existing conditions for each VEC. More detailed information is found in Section 5.2 of the proponent's EA and the addendum to the EA.

7.2.1 MARINE BENTHOS

Marine benthos are all of the flora (plants) and fauna (animals) found on the seafloor. Benthos is an important component of the marine ecosystem. Environmental effects on the benthic community may affect the success of finfish and shellfish populations in the area and thus may affect commercial fisheries. Potential interactions between the project and marine benthos relate primarily to smothering of benthic communities by drill cuttings, potential toxicity from drilling fluids, potential change in the particle size of sediments following disposition of drill cuttings, and contamination from an accidental spill or blowout.

Benthic data from adjacent exploration licences were extrapolated, from benthic surveys conducted at nearby deepwater exploration licences, to predict the habitat type and dominant benthic communities for EL2407. Based on these extrapolations, benthic habitat in the area is expected to consist of coarse sand and gravel sediment at water depths of 100-250m, silty-sandy sediment from 250-600m, and Holocene mud from 600 -1800m. These habitat types are extensive along the Scotian Slope.

Organisms likely to be present on or around coarse sediment are polychaetes (marine worms), small crustaceans such as amphipods (small crustaceans resembling fleas that are important food for fish), cumaceans and tanaids (similar to amphipods), small gastropods (shellfish with a single shell or seaslugs), ophiuroids (brittle stars/basket stars), small bivalves (shellfish such as clams), anemones, and sponges. A dominant benthic community supported by a silty/sandy substrate habitat likely includes ophiuroids, burrowing anemones, mollusks, sponges, and possible seastars, sea anemones, encrusting sponges, erect sponges, brachiopods and red crab (*Chaecon quinquedens*). Coral colonies have not been observed in the area nor are they expected due to the soft muddy sediments along the Scotian Slope. Holocene muds supports ophiuroids and burrowing anemones and possibly a deep sea species of sea urchin.

Available data suggest that there are no benthic species at risk and no critical benthic habitat in the project area.

7.2.2 MARINE FISH

Marine fish are divided into three groups. Demersal finfish are commonly referred to as groundfish, which are found near the seafloor, and include such species as Atlantic cod (*Gadus Morhua*), winter flounder (*Pseudopleuronectes americanus*) and Atlantic halibut (*Hippoglossus hippoglossus*). Pelagic species are found through the upper regions of the water column and include species such as Atlantic herring (*Clupea harengus*) and tuna. Crustaceans or shellfish include such species as crab (*Decopoda*) and lobster (*Homarus americanus*). A summary of habitat and spawning behaviour of commercially and ecological important fish species is provided in Appendix D of the proponent's EA.

There are a number of fish species found in the area that are listed with the Committee on the Status of Endangered Wildlife in Canada (COSEWIC) and/or under the SARA. These include the Atlantic cod, spotted wolffish (*Anarhichas minor*), northern wolffish (*Anarhichas denticulatus*), Atlantic wolffish (*Anarhichas lupus*), porbeagle shark (*Lamna nasus*), Atlantic salmon (*Salmo salar*), and cusk (*Brosme brosme*). Details of these species of special status are found in Table 5.2 of the proponent's EA and Appendix 2 of the Addendum to the EA report.

Fish eggs and larvae are widely distributed over the Scotian Shelf and concentrations of eggs and larvae vary with season and location. The diversity also varies with time and space. Observations by O'Boyle *et al.* (1984) and Shackell and Frank (2000) indicate the highest overall diversity and abundance occur over the Sable Island Bank, Western Bank, and Browns Bank areas.

7.2.3 MARINE MAMMALS

There have been approximately 21 species of whales, dolphins, and porpoises reported in the Nova Scotia offshore area. Of these, 15 are toothed whales and eight of these species occur with some regularity on the Scotian Shelf. In addition, there are six species of baleen whales. COSEWIC classifies the harbour porpoise (*Phocoena* phocoena), fin whale *(Baleanoptera physalus)*, and Sowerby's beaked whale *(Mesoplodon bidens)* as species of special concern. Blue whale (*Balaenoptera musculus*), northern bottlenose (*Hyperoodon ampullatus*) and north Atlantic right whales (*Eubalaena glacialis*) are listed as endangered species. All may occur in the project area.

7.2.4 MARINE TURTLES

The leatherback turtle (*Dermochelys coriacea*), loggerhead turtle (*Caretta caretta*) and Kemp's Ridley turtle (*Lepidochelys kempii*) may all occur in the project area. The leatherback turtle is listed as endangered with COSEWIC and under the SARA.

7.2.5 MARINE BIRDS

The seabird community in offshore Nova Scotia consists primarily of shearwaters, gulls and storm-petrels during the summer months, and dovekies, kittiwakes and fulmars during the winter. Shelf-slope areas where water is well-mixed are known to provide good feeding opportunities for marine birds. Different species may be more or less prevalent in the project area depending on season and location. Shearwaters are abundant from April to December, while Northern Fulmars *(Fulmarus glacialis)* are present through the year, but are most abundant between July and September.

The only species of special status, at the time of this writing, that may occur in the study area are the Roseate Tern (*Sterna dougallii)*, Arctic Tern (*Sterna paradisaea*), and Common Tern (*Sterna hirundo*). The Roseate Tern is red listed by NSDNR (2003) and protected under the provincial *Endangered Species Act*, is considered Endangered by COSEWIC (2003), and is included in Schedule 1 of the SARA. Both the Arctic and Common Tern are yellow listed by NSDNR (2003). The project area is not directly in the migratory path of these species, but individuals may occur in the study area due to weather conditions or other circumstances.

7.2.6 SPECIAL AREAS

Special areas are areas of important or critical habitat that may be affected by the project. In this case, the only special or sensitive area near the proposed activity is the Haddock Box which is located 2-5 kilometres north of EL 2407. The Haddock Box is an important nursery area for the protection of juvenile haddock, and is closed year-round by DFO to the commercial groundfish fishery. The boundaries of the Haddock Box were initially designed to encompass the high concentrations of young haddock that were consistently observed by research vessel surveys in this area. It is the largest of all commercial fishery closures on the Scotian Shelf.

Adult haddock aggregate to spawn within the Haddock Box, including Emerald Bank, from March-June, with peak spawning in March/April. Eggs are released near the bottom and rise to the surface due to their positive buoyancy. The density of the eggs increases with time, and they descend to approximately 30m. Once hatched, haddock larvae gradually descend to the bottom as juveniles in mid-summer. Juvenile haddock distribution appears to coincide with oceanographic "retention" features related to the circulation of water masses in this area. Haddock grow at a rate of 5-10 cm per year, become sexually mature at 3-5 years and are relatively long-lived (>10 years).

In addition to the information provided on the Haddock Box in BEPCo's EA and addendum, baseline information on juvenile and adult haddock, as well as eggs and larvae, was obtained by the CNSOPB from DFO and is presented in Appendix C.

7.3 OTHER OCEAN USERS

Other ocean users interested in the area may include the commercial fishery and aboriginal fisheries, scientific survey vessels, marine shipping, military, ocean mining, sub-marine cables, and activities from other petroleum operators. The commercial fishery, aboriginal commercial fishery and scientific surveys are of primary concern.

7.3.1 COMMERCIAL FISHERY

EL2407 is located within Northwest Atlantic Fisheries Organization (NAFO) areas 4Wl and 4Wm. The commercial cod fishery in these NAFO areas has been closed since 1993. DFO catch data indicates more than 26 fish species were harvested in the waters of EL2407 from 2001 to 2003. Some of the largest contributors to the groundfish catch included white hake, redfish, wolffish, halibut and pollock. Swordfish is the main pelagic species caught in the area, with the catch concentration along the Scotian Slope. Swordfish vessels use longlining gear consisting of main lines floating at or near the sea surface which can extend up to 50 nautical miles behind the fishing vessel. Red crab and Jonah crab have also been landed within EL2407. Monthly landings within the 4Wl portion of EL2407 vary from month to month and year to year. However, overall the lowest landings occur in December and highest in May and June. Within the 4Vm portion of EL2407, most of the catch was landed in May, June and October.

7.3.2 ABORIGINAL COMMERCIAL FISHERIES

The three separate Aboriginal organizations in Nova Scotia are the Confederacy of Mainland Mi'kmaq (CMM), the Union of Nova Scotia Indians (UNSI) and the Native Council of Nova Scotia (NCNS). All are part of the permanent snow crab and shrimp fleet. While there is no data for First Nation commercial fishery, data from DFO on all commercial fisheries (including aboriginal) shows no shrimp or snow crab was landed from the area covered by EL2407 in the years 2001 to 2003. The NCNS has indicated that, at present, there is not interaction between its members' fishing activities and there are no activities planned for the foreseeable future.

7.3.3 RESEARCH SURVEYS

DFO research vessels, in conjunction with the fishing industry, collect data on the status of various stocks on the Scotian Shelf through a variety of means each year. Surveys that could take place in or near the project area include the herring acoustic survey, the halibut survey, the 4Vs/4W sentinel fisheries program, and the scallop survey. These surveys are more focused on the Scotian Shelf rather than the deeper waters of the Slope.

8.0 ENVIRONMENTAL EFFECTS OF THE PROJECT

This section considers potential impacts, as well as the required mitigation and follow-up measures. It reflects a summary of the analysis conducted for each VEC by the proponent, comments received from the public, and the supplementary analysis conducted by the CNSOPB, with advice from the Department of Fisheries and Oceans, and Environment Canada as expert Federal Authorities. A more comprehensive summary of public comments may be found in Appendix B.

The CNSOPB acknowledges the reviews conducted by the expert federal departments, Environment Canada and the Department of Fisheries and Oceans, and the advice provided to the CNSOPB on this CSR as well as during its review of the proponent's EA. Both departments assisted in contributing to the baseline data and effect analysis for several of the VECs.

8.1 METHODOLOGY

The environmental assessment of the effects of the project includes: (1) an assessment of the potential impacts on each VEC identified by BEPCo, (2) additional assessment of air emissions, and (3) an assessment of cumulative environmental effects.

BOUNDARIES

Following the assessment methodology proposed by Beanlands and Duinker (1983), the environmental assessment of the project focuses on the VECs identified in the initial scoping of the project and by the proponent, including marine benthos; marine fish; marine mammals; marine turtles; marine birds; special areas (the Haddock Box); and other ocean users. In addition, on the advice of Environment Canada air emissions were assessed.

Boundaries provide a meaningful and manageable focus for an environmental assessment. In the assessment, temporal and spatial boundaries encompass those periods during, and areas within which, the VECs are likely to interact with, or be influenced by, the project. Spatial boundaries for the assessment vary according to the VEC, but are generally limited to the immediate project area. The temporal boundary of this environmental assessment is five years. Within that span, the assessment identifies temporal boundaries of the environmental effects, which are much reduced due to the short-term nature of the proposed project activities.

Ecological boundaries are determined by the spatial and temporal distributions of the biophysical VECs under consideration. Spatial ecological boundaries may be limited to the immediate project areas, or may extend well beyond the immediate footprints. Temporal

ecological boundaries consider the relevant characteristics of environmental components or populations.

Also considered were administrative boundaries, which are the spatial and temporal dimensions imposed on the environmental assessment for political, socio-cultural, or economic reasons; for example fishing areas and seasons.

SIGNIFICANCE CRITERIA

Section 16(1)(b) of the CEAA requires that the significance of environmental effects be determined.

For each VEC, the potential interactions are investigated and evaluated based on current scientific knowledge. Effects are analyzed qualitatively, and, where possible, quantitatively, using existing knowledge, professional judgment, and appropriate analytical tools.

Significant adverse environmental effects are those that will cause a change in the VEC such that its status or integrity is altered beyond an acceptable level. For physical VECs (i.e the Haddock Box), a significant effect would alter the area physically, chemically, or biologically to an extent that there is a measurable decline in abundance or diversity of a species beyond which natural recruitment would restore within a short time. For biological VECs (i.e. marine fish, marine mammals, turtles, birds), a significant effect would reduce the abundance of one or more species to a level from which population recovery is uncertain, or more than one season would be require to restore pre-project conditions. Project-related mortality exceeding natural variability within a population would be significant. For the "other ocean users" VEC (i.e. scientific research, commercial fishing), a significant effect would cause a measurable reduction of research effectiveness, or fishing income or profitability.

The significance evaluation of residual effects after mitigation for each VEC is based on the criteria as specified by the CEA Agency (1994, 1997), including: magnitude, geographic extent, frequency, duration and reversibility.

8.2 MARINE BENTHOS

BEPCO'S ASSESSMENT

The proponent's EA states that the potential interactions between the project and marine benthos relate primarily to the effects of drilling waste discharged on benthic community structure and biodiversity; noise from the VSP surveys, and accidental spills or a blowout causing organic enrichment or toxicity which may lead to a change in biodiversity from. The proponent conducted an impact assessment on the marine benthos using the above interactions with the project.

The benthic environment at the site was characterized through analysis of benthic habitat surveys collected in 2001 adjacent to Exploration Licence 2407 and professional knowledge of the Scotian Slope area. In response to comments, the proponent is confident that the survey methods portray an accurate picture of the benthic community, and it does not expect deep sea corals to occur in the area because of the habitat.

Marine benthos were identified as a VEC based on potential interactions with the project, regulatory concern, and professional experience with other petroleum industry projects. The proponent's EA states that from extrapolation of the benthic surveys, there are apparently no benthic species at risk and no critical habitats.

The zone of influence on the benthos is primarily associated with drilling discharges. The cuttings from the seafloor returns are expected to have a localized effect within 40 metres of the well site. The discharge of surface cuttings is expected to extend to a maximum of 800 metres. As indicated in the EA, surface release of WBM can result in a plume extending 15-300 kilometres in a southwest direction from the MODU. As deposition within this large area will result in SPM levels within the range of background concentrations, its effects will be negligible and have not been included in the study area.

A summary of the significance evaluation for marine benthos is presented in the following table. BEPCo concluded that activities associated with the proposed project will not result in significant environmental effects on marine benthos.

TABLE 8.1: SIGNIFICANCE EVALUATION SUMMARY - MARINE BENTHOS

	Routine Activities	**Accidental Spills and Blowouts**
Likelihood of occurrence	Will occur	See 'Frequency of occurrence' below.
Geographic extent	Drilling: top section cutting pile localized within 40 m. Surface release zone of influence (ZOI) 400-800 m VSP downhole: localized	Maximum spill distance is 37 km to 0.1 ppm
Frequency of occurrence	Continuous for top section with intermittent sweeps, bulk discharge of WBM, continuous of treated SBM	Small spills: one in every 4 years Blowout: one in every 3,500 years
Duration of impact	Drilling: intermittent over 60-90 days in total. Seismic surveys: intermittent days to one week.	Short-term; less than a year
Magnitude of impact	Low	Low
Permanence/reversibility	Hydrocarbons will be assimilated and depurated, cutting pile will be recolonised.	Reversible
Significance	**Not significant**	**Not significant**, hydrocarbons will be assimilated and depurated

PUBLIC COMMENT

Public comments were received concerning benthic habitat, deep sea coral, and other benthic organisms. Some comments questioned the extrapolation methods used by the proponent to reach conclusions on the structure of the benthic community in EL2407. There were concerns raised about the absence of a benthic survey in advance of the drilling program, or that a pre-spud survey will only cover the benthic habitat in the immediate drilling area. Questions were also raised about the potential impact on deep sea corals from drill cuttings if critical habitat is present at the wellsite.

VIEW OF THE CNSOPB

The benthic community is an important component of the marine ecosystem and is also connected to commercial fisheries. Project discharges may affect benthic habitat and communities through deposition of drill cuttings and muds. As a result, changes in sediment quality may affect the quality of habitat for demersal fish species, benthic communities, and commercial species that feed on them. Organic and inorganic contaminants in sediments may be ingested by benthic organisms or become biologically available if re-suspended into the water column. Also, contamination of the benthos from an accidental spill or blowout, and the effects of noise from the VSP surveys on crustaceans are also concerns.

DRILL WASTE DISCHARGES

The drill cuttings and mud released to the seafloor during drilling of initial hole sections will produce a small, localized pile within 10 to 40 metres of the well site. ROV surveys of post-drilling seafloor conditions around the BOP have consistently shown a cuttings mound of approximately 5 metre radius (JWEL 2002 a, b). The benthic environment is believed to comprise of common invertebrate species occurring in low density and abundance. The habitat within the project area is ubiquitous along the Scotian Slope. If non-aqueous mud cuttings released at the surface settle on the seafloor, the small concentration of SPM approximates expected background concentrations. Any elevated compounds (hydrocarbons or metals) that are present in contaminating levels from the drill cuttings and muds will not result in changes in biodiversity that will result in measurable effects on community structure outside the cutting pile. It is unlikely there are any keystone species or critical habitats, therefore any effects from the presence of drill cuttings are predicted to be reversible and of limited duration, magnitude, and geographic extent. It is the CNSOPB's opinion, that adverse environmental effects as a result of releases of drilling fluids and associated cuttings from the surface are not significant for marine benthos.

ACCIDENTAL SPILLS AND BLOWOUTS

Interaction with benthos due to the unlikely event of subsea spill or blowout would be limited near the area of release. The specific gravity of gas (including condensate) or oils used is less than seawater; therefore they would rise in the water column. Spills of synthetic-based drilling fluids may have a localized, short term impact on the seabed. Accidental events are, therefore, not considered to be an important focus for assessment of effects on marine benthos.

Further details on accidents and malfunctions are found in Section 8.11.

VERTICAL SEISMIC PROFILES

The energy levels emitted from the VSP will be less than typical for 2D or 3D seismic. Also, VSPs are of short duration compared to 2D and 3D surveys.

Results of DFO studies on the effects of seismic sound on crustaceans suggested that seismic is unlikely to cause a significant adverse environmental impact at a population level. Considering that the water depth of the BEPCo project is greater than the water depth where these studies were conducted, the received energy at the seabed would be less. Therefore, it is unlikely that similar crustacean species inhabiting the seafloor near the well sites will be negatively affected by the VSP survey.

INTRODUCED HARMFUL AQUATIC ORGANISMS

MODU's may be mobilized from other parts of the world. The ballasting and de-ballasting of these vessels can introduce harmful aquatic organisms and pathogens to marine ecosystems. This has the potential to negatively impact marine benthos in the area. It can also contribute to the introduction of other types of ship-source contaminants. The primary method used to reduce the risk of invasive species introductions is the open ocean exchange of ballast water.

Due to the reversibility, limited duration, low magnitude, and localized geographic extent of the potential environmental effects associated with this exploratory drilling project, the CNSOPB has determined the project is not likely to cause significant adverse effects on the marine benthos, provided that the mitigation proposed by the proponent, as well as that required by the CNSOPB, is implemented.

MITIGATION/FOLLOW-UP

The following summarizes the mitigation and follow-up commitments made by BEPCo in its EA:

MITIGATION

- Conduct pre-spud survey to verify characterization of benthic habitat;
- meet or exceed the CNSOPB's Offshore Waste Treatment Guidelines (2002) for discharges, including mud and cuttings;
- maximize use of WBM at all times, use of SBM only when necessary;
- chemicals will be screened through the CNSOPB's Offshore Waste Treatment Guidelines (2002) and MARPOL requirements;
- implementation of well control and drilling procedures; and
- implementation of the Emergency and Oil Spill Response Plan.

FOLLOWUP

- Environmental Compliance Monitoring (ECM) will be conducted to verify compliance with applicable policies, plans and procedures;
- review mud logs to verify volumes of mud and cuttings discharged;
- pre- and post-drilling ROV surveys to confirm model predictions on the zone of influence;
- attempt to collect post drilling sediment samples to verify the zone of influence; and
- submit a post-drilling monitoring report to the CNSOPB.

In addition to the above commitments made by BEPCo, the CNSOPB will require that:

- Upon conclusion of the pre-spud survey, BEPCo shall contact the CNSOPB to discuss the results. If a significant coral reef formation is found, appropriate mitigation, such as moving the well location, will be required.
- A qualified individual will be onboard the MODU to direct the pre- and post-drilling survey.
- BEPCo shall review their Emergency and Oil Spill Response Plan prior to drilling each well, and update the document as necessary. Also, a spill response exercise

shall be conducted at least once a year while the proponent is engaged in a drilling program.

- All MODUs and vessels used in the project that have been mobilized from foreign waters shall be required to follow the Transport Canada Guidelines for Ballast Water Exchange in Canadian Waters. Transport Canada is now proceeding with *Ballast Water Regulations*, with finalization and enactment anticipated during 2004/05. Upon enactment, vessels shall be required to adhere to the ballast water regulations.

8.3 MARINE FISH

BEPCO'S ASSESSMENT

BEPCo's assessment considered the project interactions with all life stages of commercial and non-commercial fish species, including pelagic and demersal fish and pelagic invertebrates. Potential interactions between the project and marine fish relate primarily to physical injury to fish eggs and larvae from VSP, contamination due to drill waste, and potential contamination from spills and blowouts. The proponent conducted an impact assessment on marine fish using the above interactions with the project.

The proponent determined that various activities associated with the proposed project will not result in significant adverse environmental effects on marine fish because the area of interest is not recognized as being of critical importance for feeding or spawning and the effects are reversible, of limited duration, magnitude, and geographic extent. The potential effects of offshore exploration drilling activities on marine fish are well studied and understood, leading to a high level of confidence in these effects predictions. A summary of the significance evaluation for marine fish is presented in the following table.

TABLE 8.2: SIGNIFICANCE EVALUATION SUMMARY - MARINE FISH

	Routine Activities	**Accidental Spills and Blowouts**
Likelihood of occurrence	Will occur	See 'Frequency of occurrence' below.
Geographic extent	See Table 8.1	Maximum spill distance is 37 km to 0.1 ppm
Frequency of occurrence	Continuous, see Table 8.1	Small spills: one in every 4 years Blowout: one in every 3,500 years
Duration of impact	See Table 8.1	Short-term, less than one year
Magnitude of impact	Low	Low
Permanence/reversibility	Reversible	Reversible
Significance	**Not significant**	**Not significant**

PUBLIC COMMENT

Questions were raised about the lack of reference in the proponent's EA to the Kozak and Shparkovski (1991) study that demonstrated effects of water-based clay fluids on marine fish. Comments were also received on the potential effects of noise on fish and the timing of seismic in relation to migrations and reproduction. There was criticism that the

proponent's EA lacked information for designated species that are protected under the SARA.

VIEW OF THE CNSOPB

Potential impacts on marine fish from project activities can result from physical injury caused by VSP surveys, contamination due to discharges of drilling fluids and cuttings, and from spills and blowouts.

VERTICAL SEISMIC PROFILES

The energy levels emitted from the VSP surveys will be less than typical for 2D or 3D seismic programs. Also, VSPs are of very short duration compared to 2D and 3D surveys.

Generally, results of various studies have shown egg/larval damage may occur within one to five metres of an airgun. For 2D or 3D surveys the damage to egg/larval has been calculated to less than 1% of the population, which is not measurable above natural mortality. Since the VSP survey will be stationary at one location (zero offset) or at a maximum of 1500m from the drilling rig (potential Walkaway), fish eggs and larvae mortality, if any, will be reduced to a very small area near the survey and not measurable above natural mortality.

The area where the VSP survey is to be conducted is not defined as a critical spawning area or nursery for any species, including species at risk. The areas of drilling interest are located in waters deeper than the depth range for all SARA listed (at risk) species. Therefore, it is unlikely that the area where the VSP survey will occur is important for spawning, rearing or feeding any of the listed species.

VSP activities are predicted to not result in a significant adverse effect, given the short period of the survey (8-16 hours) and the localized area of the survey.

DRILL WASTE DISCHARGES

The primary issues related to the discharge of drill cuttings and muds include: deposition on the seabed, toxicity, and bioaccumulation. There have been several studies on the impacts of drill muds and cuttings. In general, it has been found that these impacts are insignificant in the open marine environment (Thomson et al. 2000; Hurley et al. 2004).

The areas of drilling interest are located in waters deeper than the depth range for all listed (at risk) species. Therefore, it is unlikely that the area where the drill waste discharge will occur is important for spawning, rearing or feeding any of the listed species. Furthermore, the area where drill waste discharge will occur is not defined as a critical spawning site for any fish species. The release of WBM or SBM cuttings will not adversely affect population densities below the maximum sustainable level for marine fish species.

ACCIDENTAL SPILLS AND BLOWOUTS

The potential for accidental spills is primarily related to operational activities on the MODU, and support vessels. Marine diesel fuel and lube oil that could be accidentally released are on-board the vessels and MODU. Mitigation to prevent spills and contingency plans that would be implemented in the event of a spill are discussed in further detail in Section 8.11, Malfunctions and Accidents.

Although unlikely to occur, oil spills may affect water quality, which in turn may affect the health and survival of plankton, fish eggs and larvae, and juvenile and adult fish in the immediate vicinity of the well site.

The sensitivity of fish larvae to an oil spill varies depending on the type of oil; however, these effects are short lived. No conclusive evidence in the literature exists to suggest that oiled sites posed a long-term hazard to fish embryo or larval survival.

Impacts on juvenile and adult fish exposed to an oil spill or blowout can be lethal, as fish gills can be coated with oil and oil can disrupt physiological processes. Sub-lethal and long-term effects can include disruption of physiological and behavioural mechanisms, reduced tolerance to stress, and incorporation of carcinogens into the food chain (Thomson *et al.* 2000).

In EL2407, the effects of an accidental spill or blowout on marine fish and pelagic invertebrates are likely to be limited. Although oil spills and blowouts can result in fish kills, neither event has been found to result in a decrease in fish abundance. The probability of a major spill or blowout is very low.

The CNSOPB has determined that project activities are not likely to cause significant adverse effects on marine fish, provided that the mitigation measures proposed by the proponent, as well as those required by the CNSOPB, are implemented.

MITIGATION/FOLLOW-UP

The following summarizes the mitigative and follow-up commitments made by BEPCo in its EA:

MITIGATION

- a 30-minute ramp up procedure will be undertaken for each VSP;
- compliance with the CNSOPB's Offshore Waste Treatment Guidelines (2002) and MARPOL for all discharges;
- chemicals will be screened through the CNSOPB's Offshore Chemical Selection Guidelines *(*1999);
- implementation of well control and drilling procedures; and
- implementation of emergency and oil spill response plan.

FOLLOW-UP

- the rig will have an Environmental/Fisheries Observer onboard during operations to monitor interactions with fishing vessels and to serve as a liaison between the MODU and fishing boats;
- ECM will be conducted to verify compliance with applicable policies, plans and procedures; and
- in the case of a large spill, a monitoring program of impacts will be implemented.

There is no additional mitigation or follow-up required.

8.4 MARINE MAMMALS

BEPCO'S ASSESSMENT

The proponent's assessment considered primary project interactions with cetaceans (especially species at risk) related to the presence of the rigs and support vessels, noise from VSP leading to masking of cetacean vocalization, temporary threshold shift or hearing impairment, behavioural effects (*e.g.*, avoidance, changes in migration, or reproductive and feeding behaviors), physical injury, and accidental spills and blowouts leading to potential contamination.

The proponent concluded that with the implementation of the mitigation measures outlined in their EA, the effects of project components on marine mammals will not be significant. A summary of the significance evaluation for marine mammals is presented in the following table.

TABLE 8.3: SIGNIFICANCE EVALUATION SUMMARY - MARINE MAMMALS

	Routine Activities	**Accidental Spills and Blowouts**
Likelihood of occurrence	Will occur	See 'Frequency of occurrence' below.
Geographic extent	Drilling: Within 100m Seismic: Localised within 1-10 km	Maximum spill distance is 37 km to 0.1 ppm
Frequency of occurrence	Continuous	Small spills: one in every 4 years Blowout: one in every 3,500 years
Duration of impact	Drilling: Continuous presence for 60-90 days Seismic: Intermittent-days to one week	Short-term, under one year
Magnitude of impact	Low	Low
Permanence/reversibility	Reversible, immediate recovery after Project activities cease.	Reversible
Significance	**Not Significant**	**Not Significant**

PUBLIC COMMENTS

A number of comments were received expressing concern about the effects of noise on marine mammals, particularly the potential effects of seismic. Requests were also made to have trained independent marine mammal observers on the rig and support vessels, before, during and after any seismic acquisition. There was a suggestion that the proponent be required to set up acoustic monitoring stations to determine the propagation of drilling and seismic noise. There was criticism that not enough consideration was given to potential impacts of the project on species at risk.

VIEW OF THE CNSOPB

The CNSOPB has assessed the potential impact on marine mammals from sound generated by the project. The principal source of sound will be from the seismic associated with the VSP survey. This is of short-duration in relation to a 2D or 3D seismic program and very

localized. This project is not located in critical habitat for marine mammals and the standard mitigation procedures for seismic programs, which include marine mammal observers and ramp-up procedures, will be required.

There is potential that spills or gas from a blow-out could impact marine mammals. However, there is a low probability of a spill or blow-out, and marine mammals have the ability to avoid areas of a spill. BEPCo will be required to submit a spill contingency plan to the CNSOPB.

Therefore, the CNSOPB has determined that project activities are not likely to have significant adverse effects on marine mammals.

MITIGATION/FOLLOW-UP

The following summarizes the mitigative and follow-up commitments made by BEPCo in its EA:

MITIGATION

- trained observer on the MODU to ensure the delay of VSPs if marine mammals are present in the zone of influence;
- if feasible, a 30 minute ramp-up procedure will be undertaken for each VSP;
- maintenance of drilling and transport equipment and responsible management of such equipment;
- implementation of bulk transfer and hose handling procedures;
- vessels will maintain a steady course and speed, and use existing travel routes, where possible;
- helicopters will avoid flying at low altitudes;
- compliance with the CNSOPB's Offshore Waste Treatment Guidelines *(*2002) and MARPOL for all discharges;
- all chemicals will be screened through the CNSOPB's Offshore Chemical Selection Guidelines *(*1999);
- hazardous wastes will be disposed of onshore;
- implementation of well control and drilling procedures; and
- implementation of Emergency and Oil Spill Response Plan.

FOLLOW-UP

- ECM will be conducted to verify compliance with applicable policies, plans and procedures;
- a trained observer will record cetacean observations; and
- in the case of a large spill, a monitoring program of impacts will be implemented.

In addition to the above commitments made by BEPCo, the CNSOPB will require:

- BEPCo to forward the qualification of the marine mammal observer to the Board with the Application for each ADW;
- BEPCo to shut down the seismic array if a marine mammal listed as endangered or threatened (as per SARA or COSEWIC) is observed within 500m of the airguns during ramp-up procedures and when the array is active; and
- a 30-minute ramp-up procedure at all times prior to the airgun operating at full power.

8.5 MARINE TURTLES

BEPCO'S ASSESSMENT

The proponent's assessment considered project interactions with marine turtles related to potential for hearing impairment or physical injury as a result of seismic work, and oiling of sea turtles as a result of accidental releases or blowouts of hydrocarbons. Additional information on Species at Risk was provided later in the addendum, which is available on the CNSOPB's website at www.cnsopb.ns.ca under Environment in the Public Registry, or by contacting the CNSOPB office.

A summary of the significance evaluation for marine turtles is presented in the following table.

TABLE 8.4: SIGNIFICANCE EVALUATION SUMMARY - MARINE TURTLES

	Routine Activities	**Accidental Spills and Blowouts**
Likelihood of occurrence	Likely	See 'Frequency of occurrence' below.
Geographic extent	Localized within 1-10 km	Maximum spill distance is 37 km to 0.1 ppm
Frequency of occurrence	Intermittent	Small spills: one in every 4 years Blowout: one in every 3,500 years
Duration of impact	Days to one week	Short-term, under one year
Magnitude of impact	Low	Low
Permanence/reversibility	Reversible, immediate recovery after Project activities cease.	Reversible
Significance	**Not significant**	**Not significant**

PUBLIC COMMENTS

Questions were raised about the status of the Leatherback Turtle Recovery Strategy Plan and inclusion of the latest information in the proponent's EA. Comments were also provided about the need to show seasonal maps of range, distribution and densities of species at risk..

VIEW OF THE CNSOPB

The CNSOPB is involved in the consultation process for the Leatherback Turtle Recovery Strategy Plan and will apply the findings of that strategy plan that are applicable to this project. Similar mitigation measures to those described for the effects of noise on marine mammals and effects of oiling on birds shall be implemented for marine turtles.

The CNSOPB considers the potential impacts from the project on marine turtle to be similar to those for marine mammals.

Therefore, the CNSOPB has determined that project activities are not likely to have significant adverse effects on marine turtles.

MITIGATION/FOLLOW-UP

BEPCo has committed to provide observations by the trained observer to the Nova Scotia Leatherback Turtle Working Group.

In addition to the commitments made by BEPCo, the mitigation and follow-up required for marine mammals will also be applied to marine turtles.

8.6 MARINE BIRDS

BEPCO'S ASSESSMENT

The proponent states that there are no expected effects of seismic on marine birds. The proponent's assessment considered primary project interactions with marine birds related to accidental spills and blowouts, causing oiling of pelagic marine birds. A summary of the significance evaluation for marine birds is presented in the following table.

TABLE 8.5: SIGNIFICANCE EVALUATION SUMMARY - MARINE BIRDS

	Routine Activities	**Accidental Spills and Blowouts**
Likelihood of occurrence	N/A	See 'Frequency of occurrence' below.
Geographic extent	N/A	Maximum spill distance 37 km to 0.1 ppm
Frequency of occurrence	N/A	Small spills: one in every 4 years Blowout: one in every 3,500 years
Duration of impact	N/A	Short-term, under one year
Magnitude of impact	N/A	Low
Permanence/reversibility	N/A	Reversible
Significance	**N/A**	**Not Significant**

PUBLIC COMMENTS

Public comments were received on the effects of seismic on marine birds, the effects of flaring on seabird populations, the effects of light emission from vessels on seabirds, and the attraction of seabirds to offshore platforms. There was also a suggestion from the public to have a marine bird observer on board the vessels and rig to initiate more directed marine bird monitoring for the areas around the platform. Concern was also raised about the handling of marine birds that may land on an offshore facility. Questions were also raised about the lack of information on the potential effect of seismic on marine birds.

VIEW OF THE CNSOPB

Potential interactions between the project and marine birds are primarily related to oiling of birds as a result of accidental releases of hydrocarbons onto the surface of the ocean. As discussed in Section 8.11, Malfunctions and Accidents, there is a low likelihood of the occurrence of major spills or blowouts.

If an accidental oil release was to occur, it would not likely have a long term effect on marine bird populations, as pelagic seabird populations do not appear to be concentrated in the project area (Locke et al. 1994; OGOP).

Marine birds will not be significantly impacted by any routine activities associated with drilling of the exploration wells.

Concerns were raised regarding impacts from flaring and attraction to lights on MODU and supply vessels on marine birds. Marine birds may be attracted to lights and flares (Montevecchi et al., 1999). The species most vulnerable to impacts from lights and flares are night-flying seabirds, such as storm-petrels. Storm-petrels are a highly pelagic species, common to the Scotian Shelf particularly during the summer months. In the winter months, Dovekies may be attracted to flares under certain environmental conditions. Particularly sensitive times for impacts include: migration periods (April-May and August-October), during the fall exodus of young Leach's Storm-Petrels and their parents from breeding colonies (usually September-October), and under specific meteorological conditions such as fog at night.

Small numbers of birds may be disoriented, weakened or injured if they collide with the rig, but no changes in populations are expected. In very rare circumstances, there may be stochastic events (e.g., associated with weather, migratory seasons) that larger numbers of storm-petrels may be impacted. There has been no evidence of high mortality associated with long-term production projects; flaring for this project, if any, will be short-term (8-24 hour periods). Information from the EEM program for the Sable Offshore Energy Project (SOEP) has provided no evidence of seabird attraction to the project area. The low incidence of dead birds and the high frequency of the surveys suggest there was likely no large-scale fatality in the vicinity of the platforms. No fatalities were observed to occur as a direct result of flaring. The SOEP is in close proximity to the important bird habitat of Sable Island. In comparison, BEPCo's project is not located in proximity to any identified critical bird habitat, and will be operated for a short-term, with limited flaring.

The CNSOPB has determined that significant adverse effects on seabirds are not likely.

MITIGATION/FOLLOW-UP

The following summarizes the mitigative and follow-up commitments made by BEPCo in its EA:

MITIGATION

- avoidance of bird colonies by vessels and aircraft;
- maintenance of drilling and transport equipment and responsible management of such equipment;
- implementation of bulk transfer and hose handling procedures;
- minimization of flaring and the use of high efficiency igniters;
- compliance with the CNSOPB's Offshore Waste Treatment Guidelines *(*2002) and MARPOL for all discharges;
- all chemicals will be screened through the CNSOPB's Offshore Chemical Selection Guidelines (1999);
- hazardous wastes will be disposed of onshore;

- implementation of well control and drilling procedures; and
- implementation of Emergency and Oil Spill Response Plan.

FOLLOW-UP

- ECM will be conducted to verify compliance with applicable policies, plans and procedures;
- a trained observer will conduct daily surveys of marine birds and also conduct periodic searches for dead or injured birds that may have collided with the structure, or were stranded after being attracted to the structure by its lights; and
- in the case of a large spill, a monitoring program of impacts will be implemented.

In addition to the above commitments by BEPCo, the CNSOPB will require:

- area lighting on vessels and MODU's to be focused on work areas and down-shaded as much as practical;
- in the case of a small spill, the trained observer shall monitor and report impact to marine birds;
- BEPCo to adhere to the protocol for the handling and collection of injured and dead birds described in Williams and Chardine's brochure entitled, *The Leach's Storm Petrel: General Information and Handling Instructions*. To implement this protocol, BEPCo will need to obtain a permit from the Canadian Wildlife Service.

8.7 SPECIAL AREAS (HADDOCK BOX)

BEPCO'S ASSESSMENT

The proponent's assessment considered primary project interactions with the Haddock Box related to accidental spills and blowouts reducing the survival of fish eggs and larvae and causing contamination of threatened or endangered fish species. A summary of the significance evaluation for the Haddock Box is presented in the following table.

TABLE 8.6: SIGNIFICANCE EVALUATION SUMMARY - SPECIAL AREAS (THE HADDOCK BOX)

	Routine Activities	**Accidental Spills and Blowouts**
Likelihood of occurrence	N/A	See 'Frequency of occurrence' below.
Geographic extent	N/A	Maximum spill distance 37 km to 0.1 ppm
Frequency of occurrence	N/A	Small spills: one in every 4 years Blowout: one in every 3,500 years
Duration of impact	N/A	Short-term, under one year
Magnitude of impact	N/A	Low
Permanence/reversibility	N/A	Reversible
Significance	**N/A**	**Not Significant**

PUBLIC COMMENTS

There were no public comments received on the issue of the Haddock Box.

VIEW OF THE CNSOPB

The Haddock Box is the only special area in the vicinity of the project, and is located 2 -5 km north of EL2407. In addition to the information provided on the Haddock Box in BEPCo's EA and addendum, additional baseline information on juvenile and adult haddock, as well as eggs and larvae, is presented in Appendix C.

Adult haddock aggregate to spawn within the Haddock Box, including Emerald Bank, from March-June, with peak spawning in March/April. Eggs are released near the bottom and rise to the surface due to their positive buoyancy. The density of the eggs increases with time, and they descend to approximately 30m. Once hatched, haddock larvae gradually descend to the bottom as juveniles in mid-summer. Haddock grow at a rate of 5-10 cm per year, become sexually mature at 3-5 years and are relatively long-lived (>10 years). Since the early 1980's, haddock in this region have demonstrated poor growth, early maturation, low condition and high natural mortality. While abundance of adults has increased in recent years, this is mostly due to individuals less than 42cm. Abundance of large haddock (>42cm) remains low.

The primary concern is impacts due accidental spills or blowouts reducing the survival of eggs and larvae, which could in turn cause a reduction in juvenile haddock. The Haddock Box will not be affected by any routine drilling activities because it is outside of the localized zone of influence of the drill cuttings and drilling fluids dispersion.

Spill trajectory analysis in the event of a worst-case spill or blowout resulted in a maximum impact distance of 37 km from the project area until levels of 0.1 ppm are reached. This only encompasses a very small area (1.9%) of the south eastern portion of the Haddock Box. Also in the event of a spill, oil will float on the sea surface as it is lighter than water.

Potential interactions include reduced survival of eggs and larvae and contamination (tainting) of fish. However, it is unlikely that any accidental release of hydrocarbons would reach the Haddock Box, based on average current direction and the spill trajectory modeling.

The CNSOPB has determined that due to the low probably of occurrence and the small area that could be impacted, there will not likely be significant adverse effects on the Haddock Box from the proposed project. Also, mitigation measures will be in place to reduce the likelihood of accidental events occurring and ensure an effective response if needed.

MITIGATION/FOLLOW-UP

The following summarizes the mitigative and follow-up commitments made by BEPCo in its EA:

MITIGATION

- maintenance of drilling and transport equipment and responsible management of such equipment;
- implementation of bulk transfer and hose handling procedures;
- compliance with the CNSOPB's Offshore Waste Treatment Guidelines (2002) and MARPOL for all discharges;
- all chemicals will be screened through the CNSOPB's Offshore Chemical Selection Guidelines (1999);
- hazardous wastes will be disposed of onshore;
- implementation of well control and drilling procedures; and
- implementation of Emergency and Oil Spill Response Plan.

FOLLOW-UP

- ECM will be conducted to verify compliance with applicable policies, plans and procedures;
- any observed adverse effects or animal reactions will be recorded and reported to appropriate regulatory agencies; and
- in the case of a large spill, a monitoring program of impacts will be implemented.

No additional mitigative measures are required.

8.8 OTHER OCEAN USERS

BEPCO'S ASSESSMENT

The proponent's assessment considered project interactions with other ocean users related to the MODU safety exclusion zone causing loss of access, drill waste discharges causing contamination/tainting, noise from VSPs causing disturbance, wellhead abandonment in place leading to damage of fishing equipment, and accidental spills and blowouts causing tainting. Other ocean users included commercial fisheries, aboriginal fisheries, scientific surveys, marine shipping, military use, ocean mining, cables, and the petroleum industry. The focus of its assessment was commercial fishing activities, aboriginal commercial fisheries and scientific surveys.

The proponent states a high level of confidence that there will be no significant adverse environmental effects on the other users of the marine environment, including the commercial fishing industry. A summary of the significance evaluation for other users of the area is presented in the following table.

TABLE 8.7: SIGNIFICANCE EVALUATION SUMMARY - OTHER OCEAN USERS

	Routine Activities	**Accidental Spills and Blowouts**
Likelihood of occurrence	Likely	See 'Frequency of occurrence' below.
Geographic extent	Localised within 500 m	Maximum spill distance 37 km to 0.1 ppm
Frequency of occurrence	Continuous for duration of drilling program (60-90 days)	Small spills: one in every 4 years Blowout: one in every 3,500 years
Duration of impact	Less than one year per well	Short-term, under one year
Magnitude of impact	Low to medium	Low
Permanence/reversibility	Reversible	Reversible
Significance	**Not Significant**	**Not Significant**

PUBLIC COMMENT

Public comments were received on the effects of the project on commercial fisheries. Concern was expressed about the loss of access to the area for the commercial fishery due to the presence of a MODU and the potential safety hazard posed by wellheads that are not removed at the end of the project. While it was acknowledged that there is limited commercial fishing in the project area at this time, concern was expressed that when new commercial fisheries extend into the area, wellheads could pose a problem. The Board was asked to require the proponent to remove all wellheads.

It was requested that more than three years of catch data be provided and that the data be given in metric tonnes. It was suggested that this data would show the relative importance of one area to another.

One group requested that Fisheries Observers be required on all drilling facilities as a condition of activity authorization. In addition, the Board was requested to continue with its approach that requires operators to conduct exploration activity in a manner that minimizes the impact on the fishery, marine fish resources, and fish habitat. Mitigation measures that were suggested included bringing all waste to shore and timing of any vertical seismic programs (VSPs) to avoid potential impact on fish larvae and spawning activity. It was also suggested that only water based muds be allowed.

It was suggested that there is a lack of knowledge about the effects of ocean noise on fish. It was pointed out that a 1996 study showed that fish will move from an area where seismic acquisition is taking place with catches not returning to pre-seismic levels for more than five days. Concern was also expressed that the impact from noise created by seismic and drilling will be further than anticipated in the proponent's EA and that the use of an anchored semi-submersible rig for drilling will greatly reduce the impact from noise.

One group suggested that comments from fishermen are not used by the CNSOPB as it reviews or modifies a project and that an activity will go ahead regardless of the input from fishermen. It was requested that the parameters of any Environmental Effects Monitoring (EEM) program include the effects of seismic on fish larvae and fish.

VIEW OF THE CNSOPB

MODU AND VESSEL PRESENCE

The presence of the MODU and vessels may create a conflict with the use of space by commercial fisheries (including aboriginal fisheries), and possibly scientific surveys. There will be a 500m safety exclusion zone around the MODU, where non-project vessels are restricted from entering. Outside of this zone, BEPCo has committed to working with commercial fishing vessels and research vessels to minimize impacts.

The majority of the fishing effort in the area is in water depths less than 1200m, which is outside of the project area. Also, drilling of exploratory wells is very localized and of short duration, minimizing any potential impact.

DRILL WASTE DISCHARGE

Drill waste discharges have the potential to cause contamination or tainting of fish, which may result in a decrease in marketability of the product. Dispersion of drilling waste is very localized, within a small area near the MODU. Also, the project area is in water depths greater than 1200m, which is outside the main fishing area. The proponent will follow good oilfield practice, including compliance with the CNSOPB's Drilling Regulations, Offshore Waste Treatment Guidelines, and Offshore Chemical Selection Guidelines. The CNSOPB does not anticipate that the discharge of drilling waste during the conduct of the proposed project will cause contamination or tainting of fish.

VERTICAL SEISMIC PROFILES

VSPs may result in disturbance of fish in the area, which may affect the catchability in the immediate area. The activity is localized and of very short duration. BEPCo have committed to consider the needs of fishers and research programs to minimize any impacts where practical.

WELLHEAD ABANDONMENT

BEPCo plans to request approval from the Board to leave the wellheads in place upon final abandonment of the wells, which will result in a small protrusion rising some 3 to 4 metres above the seabed. There is a potential for the wellhead to snag or damage fishing gear or survey equipment, if there is activity in the area.

At the present time, the proposed locations of the wellheads are in water-depths well beyond the current technology used in trawling or dragging. Also, the locations of the wellheads would be published in the Notice to Mariners. Therefore, wellheads remaining in place upon completion of the project are unlikely to have significant impacts.

ACCIDENTAL SPILLS AND BLOWOUTS

A release of hydrocarbons into the ocean could result in either a real or perceived tainting of commercial fish, which could result in a reduction in the marketability of the fish. The probability of a large accidental event is very low. BEPCo will be required to conduct drilling operations in accordance with good oilfield practice and with the appropriate use of spill prevention and response measures to avoid these effects. Refer to Section 8.11 for additional information on accidents and malfunctions.

INTERACTIONS WITH OTHER USERS

It is recognized that marine shipping, military use, communication cables, and the petroleum industry may be other users of the marine environment in the project area. Notice to Mariners will be published on BEPCo's activities and BEPCo will use standard marine protocols to communicate and avoid collision with other vessels (commercial shipping, military). There are marine cables in the vicinity of the project area.

The CNSOPB has determined that with appropriate mitigation there will not likely be significant adverse effects on other ocean users from the proposed project.

MITIGATION / FOLLOW – UP

The following summarizes the mitigative and follow-up commitments made by BEPCo in its EA:

MITIGATION

- drilling only in depths of 1200 m or greater;
- issuance of Notice to Mariners on the location and scheduling of drilling and seismic activities;
- develop communication mechanisms with the fishing industry and research programs;
- development of a policy to address claims for compensation;
- establishment of a 500-m safety zone around the drilling rig;
- limited volume of vessel traffic and use of existing travel routes, where practical;
- chemical screening and selection of platform discharges and use of an oily water separator;
- compliance with the CNSOPB's Offshore Waste Treatment Guidelines (2002) and MARPOL for all discharges;
- all chemicals will be screened through the CNSOPB's Offshore Chemical Selection Guidelines *(*1999);
- hazardous wastes will be disposed of onshore;
- implementation of well control and drilling procedures; and
- implementation of Emergency and Oil Spill Response Plan.

FOLLOW-UP

- fisheries observers on the MODU will monitor fishing activity in the vicinity of the rig and serve as a liaison between the fishing vessels and the drill rig;
- BEPCo will continue ongoing consultations with the relevant fishery stakeholders throughout the life of the Project;
- BEPCo shall initiate communication plan with marine users; and
- BEPCo shall comply with CNSOPB's compensation guidelines.

In addition to the above commitments made by BEPCo, the CNSOPB will require that:

- the proponent avoid damage to any active marine communication cables; and
- BEPCo consult with DFO to minimize disruption to fisheries research programs.

8.9 AIR QUALITY

BEPCO'S ASSESSMENT

BEPCo has stated that the principal sources of direct emissions include fugitive emissions (barite and cement dust, halons, and volatile organic compounds) and operational emissions (vessel exhaust, exhaust fumes from diesel generators, and flaring). The emissions will be further minimized through best management practices and preventative maintenance procedures. Based on the temporary nature of the activity, regulatory controls that will be in place, and professional knowledge and judgment, BEPCo concluded that interactions with the environment will not result in any significant adverse effects, such that no further assessment is required.

In response to comment received, the proponent has stated that the project should not be characterized as a "large industrial project", as it is a temporary activity. The proponent also stated it would plan trips to be as efficient and minimal as possible, and that all vessels associated with the project will be required to comply with all applicable regulations, guidelines and laws.

PUBLIC COMMENT

Public comments were received concerning greenhouse gases emissions, reduction of emissions, and monitoring of emissions. Suggestions were made to cut emissions reducing the vessel and helicopter traffic to the MODU as much as possible. Other suggestions included using an anchored semi-submersible and adherence to MARPOL Annex VI guidelines regarding pollution from ships. In addition, requests were made to assess GHG emissions from all equipment to provide an annual GHG emissions inventory.

VIEW OF THE CNSOPB

There are limited emissions sources, but few receptors, in the project area. Other major sources of emissions in the offshore include the Sable Offshore Energy Project, and vessel-related (commercial and fishing) emissions. Air quality may be affected by the long range transport of air pollution (e.g., ozone, particulate matter).

The major emission sources from the proposed project are from the MODU, supply/stand-by vessels and, if well testing occurs, flaring. Estimates of emissions of these sources are provided below. As the nature of offshore exploration can result in uncertainties in these initial estimates, conservative estimating methods have been used.

FLARING

If well testing occurs, flaring is the largest likely emission source from exploration drilling, however, it is also the most difficult to estimate. Emissions estimates from flaring are dependent on the estimated flaring rate, flaring time, and gas composition. Since the Scotian Shelf is gas prone (CNSOPB, 2002), it is assumed that natural gas would be the hydrocarbon flared. In the unlikely event of oil being discovered and flared, it would not have a significant impact given the short duration and small volume. For the purpose of this analysis, although not anticipated due to the expected geological structures, H_2S emissions were also calculated since it has the potential to have an environment effect.

For calculating estimated emissions from flaring, the assumed flaring rate and time is based on historical activities in the Nova Scotia offshore area over the past three decades. For each of the six proposed wells, the assumed flaring time and rate are: 24 hours and 560,000 m^3/day. Also, a value of 5 ppm H_2S was utilized in the calculations. Estimates of gas composition (emission factors) were obtained from previous work (Devon 2004).

TABLE 8.8. EMISSIONS ASSOCIATED WITH FLARING FOR ONE WELL

Pollutant	Emission Factor(kg/1000 m^3)	Total Emissions(tonnes)
NOx	1.1	0.616
SO_2	0.27 *(H_2S in ppmv/100)	0.00756
$PM_{2.5}$	0.61	0.342
Benzene	0.0025	0.0014
Total PAHs	0.000048	0.000027
CO_2 (CO_2E)	1913	1100
CH_4 (CO_2E^2)	0.04*23	0.515
N_2O (CO_2E^2)	0.04*296	663

MODU AND STANDBY / SUPPLY VESSELS

The United States Environmental Protection Agency (EPA) methods[1] were followed in developing worst case emissions estimates for the MODU and standby/supply vessels. For the purpose of the comprehensive study, it was assumed that each well would take the maximum of 90 days to drill. A typical dynamically positioned drillship would produce 45,000 kW and operate at approximately one-third capacity, or approximately 15,000 kW. Supply vessel usage for each well was estimated at three round trips per week, or approximately 90 operating hours per week. Standby vessels operate (idling) around the clock at the wellsite, or 168 hrs per week. Power generated by supply and standby vessels is in the order of 6,000 kW. Also, since the Walkaway VSP surveys would be conducted from a supply vessel and are of very short duration, they are not considered in this assessment. A conservative estimate of activity was used in conducting the impact assessment (each well is predicted to take 60-90 days to drill, but the worst case scenario was used for calculations). Emissions estimates, based on these assumptions and methods are presented in Tables 8.9 and 8.10 for one well. It is anticipated that up to six wells may be drilled.

At this early stage of the project, MODUs and supply/standby vessels have not been selected, therefore estimated horsepower for the calculation of emissions has been derived from previous experience in the area.

[1]1. *Analysis of Commercial Marine Vessels Emissions and Fuel Consumption Data*. EPA 420-R-00-002. February 2002.

TABLE 8.9 EMISSIONS ASSOCIATED WITH A MODU FOR ONE WELL

Pollutant	Project Emissions/Well (tonnes)
Carbon dioxide (CO_2)	22,443
Carbon monoxide (CO)	27
Nitrogen Oxides (NO_x)	343
Particulate Matter (PM)	8.5
Sulphur Dioxide SO2	71

TABLE 8.10 EMISSIONS ASSOCIATED WITH SUPPLY AND STANDBY VESSELS FOR ONE WELL

Pollutant	Project Emissions/Well (tonnes)
Carbon dioxide (CO_2)	16,161
Carbon monoxide (CO)	62
Nitrogen Oxides (NO_x)	228
Particulate Matter (PM)	6.0
Sulphur Dioxide SO2	51

For perspective, the emissions of the proposed project are expected to be less than emissions from vessels operating in Halifax Harbour or most large industrial emissions sources during a similar time period. Based on previous experience and given the limited emission sources in the area, project emissions are not expected to cause an exceedance of applicable air quality standards or guidelines, such as the CEPA Ambient Air Quality Guidelines and the *Nova Scotia Air Quality Regulations*[2].

Based on the impact analysis, the CNSOPB has determined that project emissions are not likely to result in significant adverse environmental effects.

MITIGATION/FOLLOW-UP

The CNSOPB will require BEPCo to adhere to the following mitigation and follow-up:

- MARPOL Annex VI, *Regulations for the Prevention of Air Pollution from Ships*;
- the Air Emissions provisions of the Offshore Waste Treatment Guidelines, including the annual reporting of greenhouse gases;
- for the purpose of this project, the incineration of wastes will not be permitted in the Nova Scotia Offshore Area;
- upon completion of project activities, the proponent shall verify project-associated emission estimates based on actual operations and US EPA methods. This emission data will support an accounting of cumulative offshore emissions and contribute to a reasonable information base for future environmental assessments and continuous improvement initiatives.

8.10 EFFECTS OF THE ENVIRONMENT ON THE PROJECT

BEPCO'S ASSESSMENT

The proponent assessed changes to the project that may be caused by the environment. Environmental conditions assessed include fog; wind, waves and current conditions; iceberg and sea ice; superstructure icing, climate change and seafloor activities.

PUBLIC COMMENT

No public comments were received on the effects of the environment on the project.

VIEW OF THE CNSOPB

All MODUs working under the jurisdiction of the CNSOPB require a Certificate of Fitness issued by an approved Certifying Authority, in accordance with the Board's *Nova Scotia Offshore Certificate of Fitness Regulations*. Prior to issuing a Certificate of Fitness, the Certifying Authority must determine that the MODU is fit for the purpose for which it is to be used and can be operated safely at the drill site or in the region in which the MODU is to be operated without polluting the environment. Every MODU and every component of a MODU shall be designed in accordance with good engineering practice, taking into account the nature of the activities on and around the installation, the type and magnitude of functional loads, environmental loads, and foreseeable accidental loads, operating and ambient temperatures, corrosion conditions that may be encountered, and soil conditions.

The CNSOPB has determined that significant adverse effects from the environment on the project are unlikely.

MITIGATION / FOLLOW – UP

There is no additional mitigation or follow-up required.

8.11 MALFUNCTIONS AND ACCIDENTS

BEPCO'S ASSESSMENT

BEPCo provided a description of malfunctions and accidents that may occur during the drilling operation. They focused on blowouts (due to loss of well control) and batch spills.

The proponent had a blowout and spill risk and probability assessment conducted as part of its EA. The highest frequency of spills is from small, platform based operational spills. The probability of a large blowout from an exploratory drilling program is very small.

In addition, the proponent conducted blowout and spill fate and behaviour assessment for its proposed drilling activities. The assessment describes the general and modeled behaviour of deepwater subsea and surface condensate and gas blowouts, and small platform and vessel fuel oil discharges that could result from the project. The results showed that for this project, the greatest physical extent of effects would result from an accidental event, which, in a worst-case scenario could travel 37 km from the area of

interest before reaching a level of 0.1 ppm. The exception to this is a surface release of WBM, which can extend 15-300 km from the site.

BEPCo, as part of the addendum to their EA, also conducted an assessment on the accidental release of synthetic-based muds. Several scenarios were considered, including deck release, subsurface leak, and emergency riser disconnect. Detailed models of SBM behaviour are not available. Unless highly sheared, SBM will tend to fall to the bottom in droplets or streams. If sufficient material is present, these flows will tend to coalesce and form pools in local depressions. A surface sheen may only occur if the released material is not thoroughly emulsified, is released at or near the sea surface, or if it has experienced very high shear rates that break the emulsion. Impacts to the benthic community will likely be restricted to the immediate vicinity of the wellhead, and recovery is likely within a five year or less period; therefore, an accidental release of whole SBM is unlikely to result in significant adverse environmental effects.

BEPCo also committed to preparing an Emergency Response and Contingency Plan which details the management of identified hazards and risks.

PUBLIC COMMENT

A few comments were received expressing concern on the effects of potential spills, accidents or malfunctions. It was requested that reducing accidental spills, leaks and venting become a top priority for the CNSOPB, and that adequate monitoring take place to ensure that projects remain within GHG targets. Damage to the environment from any potential oil spill is a concern.

VIEW OF THE CNSOPB

Pollution prevention measures are important in ensuring that malfunctions and accidental events are minimized; especially since spills in a dynamic offshore environment are very difficult to respond to and are almost impossible to contain and cleanup. An important component of the proponent's operating philosophy, as well as the CNSOPB's, is the prevention of accidental events. BEPCo has committed to include in its Emergency and Oil Spill Response Plans a list of preventative measures to help reduce the risk of accidental events, which will be reviewed by the CNSOPB.

As a regulatory requirement with respect to well control, BEPCo shall focus on well design, equipment testing, and training of personnel. The CNSOPB requires that all drilling personnel working offshore Nova Scotia shall have appropriate training as defined in the Canadian Association of Petroleum Producer's *East Coast Offshore Petroleum Industry: Training and Qualification,* which includes maintaining formal Well Control Certification.

In the EA, BEPCo committed to have appropriately trained personal, defined spill preventive measures, and spill preparedness procedures in place.

Providing the mitigation proposed by the proponent in its EA, and the mitigation described in this CSR is implemented, the CNSOPB has determined that spills are not likely to cause significant adverse environmental effects. In the case of a blowout, the event itself is very unlikely.

MITIGATION / FOLLOW – UP

No addition requirements other than those previously defined are required.

8.12 CUMULATIVE EFFECTS

BEPCO'S ASSESSMENT

BEPCo's assessment considers cumulative environmental effects (environmental effects from individual projects that can accumulate and interact) for each VEC as required by CEAA. The proponent identified a number of past, present and "reasonably foreseeable" future activities, within the study area, where there is a potential for the effects to interact cumulatively with those of the project. These activities included offshore oil and gas exploration drilling and seismic projects, the Blue Atlantic Transportation System (proposed pipeline), research surveys, shipping, commercial fisheries and whaling, tourism, military exercises, telecommunication cables, use and occupation of Sable Island, and long range transportation of air pollutants.

The significance of these cumulative effects was evaluated by the proponent in accordance with the significance definitions developed for each VEC. BEPCo concluded that the potential for adverse environmental effects associated with the project can be reduced by implementation of mitigative measures contained in the environmental assessment and adherence to applicable legislation and guidelines. Temporal and spatial overlap with other projects is limited. BEPCo concludes that cumulative interaction with other projects and activities is unlikely to have significant adverse environmental effects.

PUBLIC COMMENT

Written public comment was received regarding the cumulative noise pollution resulting in impacts on marine animals, with possible ecosystem effects, and concern on impacts of chronic noise pollution on species at risk

.

Comment was also received stating that there is no consideration of the possible effects of the potential six wells on the marine ecosystem.

Public comments were also received concerning the potential of cumulative effects of different operations from the project that could combine to effect marine ecosystems and species' health. An example was the potential of cumulative effects on marine seabirds from gas flaring, attraction to offshore lights, and operations that occur during important migratory times.

VIEW OF THE CNSOPB

The CNSOPB acknowledges the potential for effects of a project to interact cumulatively with other projects. The project is not expected to result in significant adverse additive effects on commercial or non-commercial fish species, marine benthos, marine birds, marine mammals or sea turtles. With respect to special areas, the likelihood of cumulative effects from potential future oil and gas activities have been evaluated and determined not to be significant by the Board (Thompson et al, 2000). The environmental effects of future oil and gas activities will be regulated by the Board such that consideration will be given to

potential cumulative effects of any future project with past projects. This is also a requirement of the CEAA. With respect to the commercial fishing industry, the Board is satisfied that BEPCo has committed to and acknowledged the importance of effective communication with the fishing industry to minimize any interactions and impacts.

Due to the limited duration, localized potential impacts, regulatory controls and mitigation as presented in this CSR, the Board has determined that the project is unlikely to interact cumulatively with other projects (past, present or likely future projects).

MITIGATION / FOLLOW – UP

No additional mitigation or follow-up is required

8.13 CAPACITY OF RENEWABLE RESOURCES

BEPCO'S ASSESSMENT

The proponent considered the capacity of renewable resources that are likely to be significantly affected by the project to meet the needs of the present and those of the future, as a component of their assessment of the environmental effects of the project on marine fish (commercial and non-commercial species).

PUBLIC COMMENT

No public comments were received on the capacity of renewable resources that are likely to be significantly affected by the project to meet the needs of the present and those of the future.

VIEW OF THE CNSOPB

Subsection 16 (1)(d) of the CEAA requires that every comprehensive study of a project shall include a consideration of the capacity of renewable resources that are likely to be significantly affected by the project to meet the needs of the present and those of the future. The analysis of BEPCo's proposed exploration drilling project has shown that no renewable resources are likely to be significantly effected; therefore no further analysis is required.

MITIGATION / FOLLOW – UP

No additional mitigation or follow-up is required

9.0 DETERMINATION OF ENVIRONMENTAL EFFECTS SIGNIFICANCE

The purpose of the comprehensive study is to assess the potential environmental effects of BEPCo's proposed exploratory drilling project on Exploration Licence 2407. As required under the *Canadian Environmental Assessment Act*, the comprehensive study is focused on establishing whether significant adverse environmental effects are likely to result from the proposed exploratory drilling project taking into account the identified mitigation measures.

The CNSOPB reviewed the environmental effects analysis presented by BEPCo in its technical EA Report, as well as comments received from the public and expert federal departments. A valued ecosystem component (VEC) based assessment on the interaction of project activities on the VECs were used in assessing environmental effects. The environmental assessment methodology and approach used by the proponent is acceptable to the CNSOPB; however the CNSOPB, in collaboration with EC and DFO, did conduct additional analysis beyond the work in the proponent's EA. The CNSOPB is satisfied with the environmental information provided by BEPCo regarding the potential adverse effects on the VECs.

In accordance with sub-section 16(1)(b) of *the Canadian Environmental Assessment Act*, the Canada-Nova Scotia Offshore Petroleum Board, has considered the significance of the environmental effects of the project and has determined that, taking into account the implementation of the following mitigation measures and those committed to by BEPCo, **the project is not likely to result in significant adverse environmental effects**.

9.1 REQUIRED MITIGATION AND FOLLOW-UP

The following is a list of conditions to be imposed on the proponent for mitigation and follow-up:

9.1.1 MITIGATION

1. BEPCo shall adhere to its own mitigation commitments outlined in its EA and supporting documents, and include the following:

   a) conducting a pre-spud survey to verify characterization of benthic habitat;

   b) meeting or exceeding the CNSOPB's Offshore Waste Treatment Guidelines (2002) and MARPOL for discharges, including mud and cuttings;

   c) maximizing the use of WBM at all times, use of SBM only when necessary;

   d) chemicals will be screened through the Guidelines Respecting the Selection Of Chemicals Intended To Be Used In Conjunction with Offshore Drilling & Production Activities On Frontier Lands (OCSG) (1999) and MARPOL requirements;

   e) implementation of well control and drilling procedures;

   f) implementation of the Emergency and Oil Spill Response Plan;

   g) a 30-minute ramp up procedure will be undertaken for each VSP;

   h) a trained observer will be present on the MODU to ensure the delay of VSPs if marine mammals are present in the zone of influence;

i) maintenance of drilling and transport equipment and responsible management of such equipment;

j) implementation of bulk transfer and hose handling procedures;

k) vessels will maintain a steady course and speed, and use existing travel routes, where possible;

l) helicopters will avoid flying at low altitudes;

m) hazardous wastes will be disposed of onshore;

n) avoidance of bird colonies by vessels and aircraft;

o) minimization of flaring and the use of high efficiency igniters;

p) drilling only within depths of 1200 m or greater;

q) issuance of Notice to Mariners on the location and scheduling of drilling and seismic activities;

r) developing communication mechanisms with the fishing industry and research programs;

s) development of a policy to address claims for compensation;

t) establishment of a 500-m safety zone around the drilling rig;

u) limited volume of vessel traffic and use of existing travel routes, where practical;

v) chemical screening and selection of platform discharges and use of an oily water separator;

2. Upon conclusion of the pre-spud survey, BEPCo shall contact the CNSOPB to discuss the results. If a significant coral reef formation is found, appropriate mitigation, such as moving the well location, will be required.

3. A qualified individual will be onboard the MODU to direct the pre and post drilling survey.

4. BEPCo shall review its Emergency and Oil Spill Response Plan prior to drilling each well, and update the document as necessary. Also, a spill response exercise shall be conducted at least once a year while the proponent is engaged in a drilling program.

5. All MODUs and vessels used in the project that have been mobilized from foreign waters shall be required to follow the Transport Canada Guidelines for Ballast Water Exchange in Canadian Waters. Transport Canada is now proceeding with *Ballast Water Regulations*, and finalization and enactment

is anticipated during 2004/05. Upon enactment, vessels shall be required to adhere to the ballast water regulations.

6. If a biocide is proposed for use in the cooling water of the MODU and discharged to the ocean, BEPCo shall submit with its Drilling Program Authorization details on the biocide selected and a discussion of alternates to the chosen biocide.

7. BEPCo shall forward the qualifications of the marine mammal observer to the Board with its application for each ADW.

8. BEPCo shall shut down the seismic array if a marine mammal listed as endangered or threatened (as per SARA or COSEWIC) is observed within 500m of the airguns during ramp-up procedures and when the array is active.

9. A 30-minute ramp-up procedure will be required at all times prior to the airgun operating at full power.

10. The mitigation and follow-up required for marine mammals will also be applied to marine turtles.

11. Area lighting on vessels and MODU's shall be focused on work areas and down-shaded as much as practical to minimize marine bird attraction.

12. BEPCo shall adhere to the protocol for the handling and collection of injured and dead birds described in Williams and Chardine's brochure entitled, *The Leach's Storm Petrel: General Information and Handling Instructions*. To implement this protocol, BEPCo will need to obtain a permit from the Canadian Wildlife Service.

13. The proponent shall avoid damage to any active marine communication cables.

14. BEPCo shall consult with the DFO regarding fisheries research programs, to develop a mutually acceptable procedure to minimize disruption to both activities.

15. The proponent will be required to adhere to MARPOL Annex VI, *Regulations for the Prevention of Air Pollution from Ships*.

16. BEPCo will adhere to the Air Emissions provisions of the Offshore Waste Treatment Guidelines, including the annual reporting of greenhouse gases.

17. Incineration of wastes will not be permitted, for the purpose of this project, in the Nova Scotia Offshore Area.

9.1.2 FOLLOW-UP

1. BEPCo shall adhere to its own follow-up commitments outlined in its EA and supporting documents and shall submit a report to the Board within 90 days upon completion of each well which will include the following:

a. Environmental Compliance Monitoring (ECM) will be conducted to verify compliance with applicable policies, plans and procedures;

b. review of mud logs to verify volumes of mud and cuttings discharged;

c. pre- and post-drilling ROV surveys to confirm model predictions on the zone of influence;

d. attempt to collect post drilling sediment samples to verify the zone of influence;

e. submission of a post-drilling monitoring report to the CNSOPB;

f. the rig will have an Environmental/Fisheries Observer onboard during operations to monitor interactions with fishing vessels and serve as a liaison between the MODU and fishing boats;

g. in the case of a large spill, a monitoring program of impacts will be implemented;

h. in the case of a small spill, the trained observer shall monitor and report impact to marine birds;

i. a trained observer will record cetaceans observations;

j. the observer shall provide marine turtle observations to the Nova Scotia Leatherback Turtle Working Group;

k. the trained observer will conduct daily surveys of marine birds and also conduct periodic searches for dead or injured birds that may have collided with the structure, or were stranded after being attracted to the structure by its lights;

l. any observed adverse effects or animal reactions will be recorded and reported to appropriate regulatory agencies;

m. BEPCo will continue ongoing consultations with the relevant fishery stakeholders throughout the life of the project;

n. BEPCo shall initiate communication plan with other marine users;

o. BEPCo shall comply with CNSOPB's compensation guidelines.

2. Upon completion of project activities, the proponent shall verify project-associated emission estimates based on actual operations and US EPA methods. This emission data will support an accounting of cumulative offshore emissions and contribute to a reasonable information base for future environmental assessments and continuous improvement initiatives.

3. The information from the pre-spud ROV survey, post drilling survey and marine bird and mammal observations will be added to the environmental effects monitoring report to be submitted to the CNSOPB.

_____ _____

J.E (Jim) Dickey Date
Chief Executive Officer
Canada-Nova Scotia Offshore Petroleum Board

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APPENDIX A

SCOPE OF COMPREHENSIVE STUDY

SCOPE OF COMPREHENSIVE STUDY –
BEPCO CANADA COMPANY
EXPLORATORY DRILLING PROGRAM
ON
EXPLORATION LICENCE 2407

1.0 Purpose

This document provides a description of the scope of the project, the factors to be considered and the scope of the factors related to the Comprehensive Study (CS) for BEPCo Canada Company's (BEPCo) proposed exploratory drilling project in Exploration Licence 2407. This document has been developed by the Canada-Nova Scotia Offshore Petroleum Board (CNSOPB), as a Responsible Authority (RA), in consultation with the Canadian Environmental Assessment Agency (CEA Agency) as the Federal Environmental Assessment Coordinator (FEAC), and with the Department of Fisheries and Oceans (DFO), and Environment Canada (EC), which have been identified as expert Federal Authorities.

2.0 Scope of Project

The proposed exploratory drilling activity will occur in the marine waters under the jurisdiction of the CNSOPB in EL2407, located approximately 190 km from Halifax, on the Scotian Slope. BEPCo, the Proponent, is proposing a multi-year, multi-well drilling program. It is anticipated that one exploration well will be drilled per year between 2005 and 2007. If significant hydrocarbons are discovered, this may be followed by drilling delineation/appraisal wells and/or pre-development drilling to determine the extent of the reservoir. Two appraisal wells may be drilled in 2008 and a third well may be drilled in 2009. Also, the proponent may conduct two Vertical Seismic Profiles (VSPs) during the drilling of each well.

Specific well locations have not been determined; however, the areas of interest are located in the deep water portion of their exploration licence, in water depths greater than 1,200 m. BEPCo initially proposes to drill the first well in a water depth of approximately 1,450 meters. The approximate location of this well is 42 39'19.974"N and 63 04' 33.726"W.

In summary, the proposed project could consist of drilling a maximum of six wells over a five year period. For additional details, refer to the Project Description submitted by BEPCo to the Canada-Nova Scotia Offshore Petroleum Board on April 28, 2004.

3.0 Regulatory Considerations

The Project will require authorizations pursuant to Section 142 (1)(b) of the Canada-Nova Scotia Offshore Petroleum Resources Accord Implementation Act (S.C. 1988, c. 28) (Accord Act). Issuance of this authorization is described in the BEPCo Canada Company Law List Regulations of

the Canadian Environmental Assessment Act (CEA Act) and therefore constitutes a power as described in sub-section 5(1)(d) of the CEA Act.

The CNSOPB, as the Responsible Authority (RA) must ensure that an environmental assessment of the Project is conducted. The Project as proposed is described in Item 15 of the Comprehensive Study List Regulations of the CEA Act.

Pursuant to Section 17(1) of the CEA Act, the CNSOPB will delegate the conduct of the comprehensive study to BEPCo. The BEPCo will prepare and submit to the Board an EA report. Following the review of the information provided by BEPCo, the CNSOPB, in consultation with the CEA Agency, DFO and EC will prepare the Comprehensive Study Report, which will be submitted to the Minister of the Environment.

The CEA Agency will be the FEAC respecting the assessment. In this role it will be responsible for coordinating the review activities of the CNSOPB, EC and DFO, in accordance with Section 12 of the CEA Act.

4.0 Public Participation

The Comprehensive Study process requires that the public be given ample opportunity to participate in the review of the environmental assessment. Public participation is actively sought while the Comprehensive Study Report is being prepared and while it is being reviewed. There are three distinct stages for public consultation. The first is during the preparation of the scope of the environmental assessment and while deciding which assessment process should be used, the second is during the preparation of the Comprehensive Study, and the third is during the comment period administered by the Agency on the completed comprehensive study report.

The public will have 21 days to provide written comment to the Board on the draft Scoping Document, up to four weeks to submit written comments to the Board on the EA Report provided by BEPCo, and a period, to be determined by the Canadian Environmental Assessment Agency, to examine the CSR, while it is being reviewed by the Minister. This final public review period is typically 30 days. The Board will advertise, in provincial and community newspapers, the public consultation periods for the Scoping Document and EA Report, as well as, issuing news releases to encourage public participation.

The Board will receive all public comments on the Scoping Document and EA Report and distribute these to the expert federal authorities and the Agency. The CSR BEPCo must demonstrate how such comments were considered, and note any changes made as a result of that consideration.

A public registry has been established for the project and the project is listed on the Canadian Environmental Assessment Registry (reference number 04-03-2712).

5.0 Factors to be Considered

The Comprehensive Study shall include a consideration of the following factors as described in Subsections 16(1) and (2) of the CEA Act:

Factors to be considered in accordance with subsection 16(1) are:

- The environmental effects of the project, including the environmental effects of malfunctions or accidents that may occur in connection with the project and any cumulative environmental effects that are likely to result from the project in combination with other projects or activities that have been or will be carried out;
- The significance of the environmental effects;
- Comments from the public that are received in accordance with the Canadian Environmental Assessment Act and its regulations;
- Measures that are technically and economically feasible and that would mitigate any significant adverse environmental effects of the project; and
- The need for and alternatives to the project.

Factors to be considered in accordance with subsection 16(2) are:

- The purpose of the project;
- Alternative means of carrying out the project that are technically and economically feasible and the environmental effects of any such alternative means;
- The need for, and the requirements of, any follow-up program in respect of the project; and
- The capacity of renewable resources that are likely to be significantly affected by the project to meet the needs of the present and those of the future.

It is recognized that environmental assessment is conducted at the early phases of project planning when alternative means of carrying out the project are under study and project details have yet to be finalized. As set out in this scoping document, alternative means of carrying out the project must be considered in the comprehensive study.

6.0 Scope of the Factors to be Considered

The CS will address the factors listed above, and document any issues and concerns that may be identified by the proponent through regulatory, stakeholder, and public consultation.

BEPCo intends to use the "valued ecosystem component" (VEC) approach to focus the analysis in the environmental assessment. A definition of each VEC (including components or subsets thereof) identified for the purposes of environmental assessment, and the rationale for its selection, shall be provided.

The environmental assessment will consider the potential effects of the proposed physical activity within spatial and temporal boundaries that encompass the periods and areas during and within which the Project may potentially interact with, and have an effect on, one or more VEC. These boundaries may vary with each VEC and the factors considered, and should reflect a consideration of:

- the proposed schedule/timing of the drilling program;
- the natural variation of a VEC or subset thereof;
- interrelationships/interactions between and within VECs;

- the time required for recovery from an effect and/or return to a pre-effect condition, including the estimated proportion, level, or amount of recovery;
- the area within which a VEC functions and within which a Project effect may be felt,

the assessment of cumulative environmental effects should be consistent with the principles described in the February 1999 CEAA *Cumulative Effects Assessment Practitioners Guide* and in the March 1999 CEAA operational policy statement *Addressing Cumulative Environmental Effects under the Canadian Environmental Assessment Act*, and will include a consideration of environmental effects that are likely to result from the proposed Project in combination with other projects or activities that have been or will be carried out. These include, but are not limited to: other oil and gas activities and fishing activities.

7.0 Spatial and Temporal Boundaries

The proponent shall clearly define, and provide the rationale for the spatial and temporal boundaries that are used in its environmental assessment. All VECs must be given adequate attention throughout the core study area. Any VEC-specific variation from the core study area should be identified and the rationale provided. Boundaries should be flexible and adaptive to enable adjustment or alteration based on field data.

***The selection of spatial boundaries for the study area shall be consistent with the CEA Agency's Operational Policy* "The Process for Defining the Spatial Boundary of a Study Area During an Environmental Assessment of Offshore Exploratory Drilling Projects".**

The temporal scope should describe the timing of Project activities.

8.0 Summary of Potential Issues

The following table is a list of environments, ecosystem components, project activities and environmental influences that, as a minimum, the comprehensive study must consider. **The list is not intended to be exhaustive and is provided solely to guide the proponent as to the type of content expected in the environmental assessment**. The proponent should carefully examine this list and expand upon it where necessary. In general, all applicable interactions should be considered.

The selection criteria for VECs must be described, with explanations of why a particular VEC was or was not chosen from the list below. The environmental protection objectives for each VEC should be identified, based on applicable legislation, policies and site-specific considerations. These objectives can be helpful in analyzing the significance of effects and in determining appropriate mitigation and follow-up measures.

Table: Summary of Environment Assessment Considerations

Description of Major Environments	• Marine Physical, Biological and chemical • Atmospheric • Geologic (geomorphology, marine sediments, sediment quality)
Ecosystem Components (candidate Valued Ecosystem Components, to be considered in all relevant environments for all relevant seasons)	• Air quality • Water quality • Fish and fish habitat • Marine Mammals • Archaeological and heritage resources • Benthos • Vegetation • Plankton • Birds and bird habitat
Species at Risk (SAR):	• description to the extent possible of SAR in the project and affected areas • environmental effects due to the project, including cumulative effects, on those SAR identified • means by which adverse effects upon SAR and their critical habitat may be mitigated through design and/or operational procedures
Special Areas	• provide a description of any 'sensitive areas' in the project area, such as important or critical habitat • environmental effects due to the Project, including cumulative effects, on those sensitive areas identified • means by which adverse effects upon "sensitive areas" may be mitigated through design and/or operational procedures
Potential Effects upon other Ocean Users	• Interactions with commercial fisheries • Interactions with scientific research surveys • Aboriginal interests (traditional knowledge and fishing, current use activities, cultural sites)
Project Activities (possible causes of environmental effects)	• Description of physical project components (drilling platform, support vessels, aircraft, infrastructure) • Normal and fugitive air emissions (e.g. greenhouse gases (CO2, methane), H2S, SO2, NOX, VOCs, CO, particulate matter, toxics; from activities such as well testing, venting, incineration) • Potential release of toxic and priority substances listed under the authority of the Canadian Environmental Protection Act • Marine discharges (drill fluids and cuttings, biocides, grey water, black water, chlorinated waste water, galley waste) • Noise • Onshore waste disposal • Vessel traffic • Aircraft activity • Malfunctions and accidental events (e.g. spills or leaks of hydrocarbons or chemicals, blowouts

Environmental Influences (conditions acting on the project that could have consequences for the environment; factors which could affect the project design or operation)	• Meteorology and oceanography (e.g. extreme winds, waves, currents and precipitation, fog, freezing spray) • Seismic activity • Ice regime • Corrosion • Climate change
Environmental management system and its components	• Pollution prevention policies and procedures • Program(s) for compensation of affected parties, including fisheries interests, for accidental damage resulting from project activities • Emergency response plan(s)
Follow-up Monitoring	• Discuss the need for and requirements of a follow-up program

9.0 Significance of Adverse Environmental Effects

The Proponent shall clearly describe the criteria by which it proposes to define the "significance" of any adverse effects (i.e., following the employment of mitigative measures) that are predicted by the environmental assessment. This definition should be consistent with the November 1994 CEA Agency reference guide *Determining Whether a Project is Likely to Cause Significant Adverse Environmental Effects*, and be relevant to consideration of each VEC (including components or subsets thereof) that is identified.

References

Canadian Environmental Assessment Act, November 2003. http://laws.justice.gc.ca/en/c-15.2/text.html

Law List Regulations, 1999. http://www.ceaa.gc.ca/013/lawlist_e.htm

Comprehensive Study List Regulations, November 4, 1999. http://www.ceaa.gc.ca/013/complist_e.htm

Cumulative Effects Assessment Practitioners Guide, February 1999. http://www.ceaa.gc.ca/013/0001/0004/index_e.htm

Operational Policy Statement, *Addressing Cumulative Environmental Effects under the Canadian Environmental Assessment Act*, March 1999. http://www.ceaa.gc.ca/013/0002/cea_ops_e.htm

CEAA Operational Policy *The Process for Defining the Spatial Boundary of a Study Area During an Environmental Assessment of Offshore Exploratory Drilling Projects,* October 28, 2003. http://www.ceaa.gc.ca/013/0002/drilling_ops_e.htm

APPENDIX B
PUBLIC COMMENTS

TABLE A.1 SUMMARY OF PUBLIC COMMENTS, BEPCO'S RESPONSE, AND THE BOARD'S RESPONSE TO THOSE COMMENTS

COMMENT	PROPONENT'S RESPONSE	CNSOPB'S RESPONSE
ALTERNATIVES TO THE PROJECT		
The proponent states that there are "no feasible alternatives to the project at this time." An alternative to the project would be one that achieves the same "end" or purpose. Presumably, the purpose of this project is to meet the energy needs of the US and, to a lesser degree, Canadian economies. However, the proponent has not explored options for meeting this objective, such as conservation of energy strategies or use of renewable energy sources. A cost benefit analysis of several alternatives, including the "do nothing" alternative is suggested.[1]	The EA Report acknowledges alternative energies, energy conservation and decreased energy exports as alternatives to oil and gas production. However, since these alternatives do not alone meet the current demand for gas energy and do not preclude oil and gas exploration, they are better considered as complimentary activities, rather than alternative ways of achieving the same end. In addition, in terms of determining whether or not commercially viable reserves of hydrocarbons exist in EL 2407 (*i.e.,* the purpose of the current Project), ground-truthing, in the form of exploration drilling, is the only option. Given the tremendous costs associated with deep-water drilling and the risks that this investment will not be recovered, oil and gas companies have a great interest in discovering a viable alternative to exploration drilling that currently does not exist.	The purpose of the project is exploration for petroleum resources. There are no other alternatives to drilling wells to determine whether or not petroleum resources exist. See Section 3.1 of this report for further information
Scope		
Any environmental assessment should also consider the impact of production drilling scenarios. If production drilling would result in too much damage, exploration drilling should not be allowed.[1]	BEPCo. indicated that no response was required. This is considered outside of the scope of the EA Report and Scoping Document. Any future production project would be fully assessed and subject to its own approval process.	Production drilling (part of a development project) is outside of the scope of this project. If BEPCo's exploration program discovers commercial petroleum reserves and BEPCo wishes to produce the reserves, they will be required to submit a Development Plan application to the Board for approval. This application will trigger a separate CEAA environmental assessment for the project.

[1] Ecology Action Centre

COMMENT	PROPONENT'S RESPONSE	CNSOPB'S RESPONSE
BENTHIC HABITAT		
The most glaring problem with the EA is the absence of a benthic survey to describe existing habitats and biota and collect the baseline data for effective environmental monitoring. The EA assumes that the benthos of the project area is the same as adjacent areas that have been surveyed prior to previous drilling proposals. This decision undermines the very reason for the CEAA requirements of a more rigorous level of assessment for areas that have not been previously assessed. Proceeding with the project without conducting a benthic survey also runs the risk of impacting yet to be discovered features of high conservation value (such as corals). Recommend that this program should not move forward before detailed benthic surveys of the area are conducted.[2]	Jacques Whitford has conducted deep sea benthic surveys on 18 exploration licences along the Scotian Slope to depths of 4000 m, gathering hundreds of photographs and surficial samples; an effort yet to be paralleled by any other organization. Therefore, the confidence of the study team is high regarding the habitat characteristics in EL2407. The physical footprint of Project affects on the seafloor from drilling exploration wells is very small. The well site survey will cover an area ranging from 30,000 m^2 to 70,000 m^2. This is much larger than the area likely to be affected by drilling mud and cuttings discharges. Refer also to response provided for DFO-7 in the addendum. Coral reef structures are found in distinctive habitats, which are not present in EL 2407. Seafloor images from 2D and 3D surveys show the absence of such habitat features. Neither are there any incised shelf features in the block.	The CNSOPB is comfortable that the habitat characterization of the area as described in the EA is reasonable. However, BEPCo will be required to conduct a pre-drilling survey to confirm these predictions. BEPCo will be required to report the results of the pre-drilling survey immediately upon completion. If the habitat is different than predicted and deep sea coral reefs are found, BEPCo will be required to conduct appropriate mitigation, such as moving the well site location.
The benthic habitat data being transposed onto block EL 2407 is incomplete. Benthic survey methods in the adjacent exploration licences were conducted using transects at widely spaced intervals on the seabed. It would be possible to miss sensitive species and habitat in the areas between these sampling sites.[1]	Deep sea benthic communities are typically described as follows "most deep-sea animals tend to be generally small and fragile, and they display low densities and overall biomass" (US MMS on Chemosynthetic Communities of the Gulf of Mexico). The statements in the EA Report are based on benthic surveys of 18 deep water exploration licences conducted in 2000 and 2001 by Jacques Whitford, and evidence from hundreds of associated photographs and grab samples on the Scotian Slope.	See above response.

[1]Ecology Action Centre
[2]World Wildlife Fund[3]

COMMENT	PROPONENT'S RESPONSE	CNSOPB'S RESPONSE
	Coral colonization, as inferred from the comment to be a reef structure, requires specific habitat features. Such features do not occur in EL 2407.	
The pre-spud survey will not provide a sufficient description of the benthos. Only benthic habitat in the immediate drilling area is considered. [1]	The well site survey can cover an area of over 70,000 m^2 around the wellhead. This distance far exceeds the zone of influence from smothering as a result of drill cuttings discharge.	The pre-spud survey will cover an appropriate area around the wellhead to confirm whether or not sensitive species are present.
Not conducting a survey is contrary to the basis of the benthic habitat work that DFO has been conducting for ocean management purposes. Until DFO has completed this work on the western Scotian Slope, this project should not go ahead.[1]		The benthic habitat studies being conducted by DFO will not be fully completed and published for several years. In the CNSOPB's opinion, BEPCo's characterization, provided it is verified with the required pre-drilling survey, is adequate for this project.
Will DFO and the CNSOPB require that a comprehensive baseline benthic habitat study be completed by BEPCo. for EL 2407?[1]		BEPCo will be required to conduct a pre-drilling ROV survey and post-drilling monitoring of the benthic habitat to confirm their benthic characterization and effects predictions.
There is no data and images provided of the seabed topography.[1]	Figure 5.1b of the EA has an underlay of the seafloor terrain obtained by 3D data acquisition. It is faint due to the lack of dramatic seafloor terrain within the licence. A larger map is provided in Appendix 9 of the addendum.	See above response
DEEP SEA CORAL		
An adverse significant effect could occur due to smothering from drill cuttings and muds if sensitive or critical habitat were present. Loss of a coral colony(s) could significantly affect the species viability on the Scotian Slope. Little is known on	Coral colonization, as inferred from the comment to be a reef structure, requires specific habitat features. Such features do not occur in EL2407. Refer also to the response provided for WWF-1 in the addendum.	Corals are not expected to be present in the study area since habitat features in the area are unlikely to support coral colonization. Also, prior to spudding any well, BEPCo will be required to conduct an ROV survey of the wellsite to confirm that there are

COMMENT	PROPONENT'S RESPONSE	CNSOPB'S RESPONSE
how loss of an area of coral could affect the 'population's' survivability.[1]		no corals in the area. If corals are present, BEPCo will be required to conduct appropriate mitigation, such as moving the well site location.
The report sites that "It has been shown that an exposure of 1 to 10 mg/L of SPM has no effects on corals, a species considered to be sensitive to sedimentation (Thomson et al. 2000, p. 175)." Research testing the toxicity of water-based drilling muds on tropical corals (*Paracyathus stearnsii*) at even low levels of drilling mud concentration, 0.02 mg/L (ppm), resulted in a 40% tissue loss after 8 days and a 60% drop in viability after 8 days. Further research is required on the sensitivities of corals, in particular coldwater corals, to drilling fluids and sedimentation.[1]	Further research on all aspects of cold deepwater coral is required. However, this is outside the scope of the current EA Report. The EA Report is based on available literature and addresses data gaps and associated levels of confidence in significance predictions, where appropriate.	See above response.
COMMERCIAL FISHERIES		
More than 3 years of catch data should be provided in order to adequately capture a species variation in species distribution over time due to environmental factors. Commercial fishing data should be given in metric tonnes to show the relative importance of one	Catch data for 2001 to 2003 is shown. The important factor is fishing effort when considering space-use conflict issues. The amount of fish landed is not being judged.	The CNSOPB has focused its review on the impact of this project on the current commercial fishery. The CNSOPB is satisfied that the use of catch data from 2001 to 2003 is appropriate for the characterization of the current fishery within

[1] Ecology Action Centre

COMMENT	PROPONENT'S RESPONSE	CNSOPB'S RESPONSE
area to another.[1]		the area.
Loss of access to the bottom and fishing ground was identified as a concern.[1]	This issue has been fully assessed in the EA Report and through the additional information provided in the addendum.	All drilling programs are required to maintain a safety zone around the MODU while in operation. This safety zone encompasses a 500m radius around the MODU or 50m beyond the anchor pattern, which ever is greater. This zone is only temporary (60-90 days), while the MODU is on location and is not considered significant. Also, see response to the following comment regarding wellheads.
Wellheads represent a significant potential safety hazard for the fishery due to gear snagging. Currently there is limited fishing in this area. We are concerned that these wellheads will be a safety hazard when new commercial fisheries extend to this area. Recommend that the CNSOPB require BEPCo Canada remove all wellheads.[3]	As stated in the EA Report, BEPCo believes wellhead abandonment in waters 1,200m and deeper will not be a hazard to fishing or other marine activities, nor will it pose any additional environmental risk. However, BEPCo will comply with all CNSOPB conditions of approval, including wellhead removal, if required.	The CNSOPB has reviewed the issue of abandoning deepwater wellheads extensively. Advice received from DFO, the FAC and others during this review, indicated that commercial fisheries were unlikely to occur in water depths greater than 1200m. In the case of BEPCo's project, all wells will be in water depths greater than 1200m and no fisheries have been identified at that depth.
A delegation of N. S. fishermen themselves identified the need for immediate action in relation to "especially valuable areas" (NS Department of Energy, 2004). How is the Fisheries Advisory Committee of the CNSOPB working with this body of fishers?[1]	No response required from BEPCo. This is beyond the scope of the EA for this project	This is outside of the scope of the EA. However, several members of the delegation are on the CNSOPB's FAC. Also, CNSOPB's Environmental Advisor was part of the delegation.
The BEPCo EA report includes a number of references to having Fisheries Observers on site. We request the CNSOPB undertake this approach, and	BEPCo is committed to fulfilling all commitments made during the environmental assessment process, including the use of an Environmental/Fisheries	Any commitments made by BEPCo in its EA will be a condition of approval of its program. Therefore, an Environmental/Fisheries Observer

[1] Ecology Action Centre
[3]Seafood Producers Association of Nova Scotia
[1]Ecology Action Centre

COMMENT	PROPONENT'S RESPONSE	CNSOPB'S RESPONSE
make it a condition of approval for the drilling authorization[3]	Observer.	will be a condition of authorization, if the project is approved.
There is presently limited fishing in the project area. There are commercially important stocks of fish in the EL2407 general area. Request that the CNSOPB continue with its approach for oil and gas operators to conduct exploration activity in a manner that minimizes the impact on the fishery, marine fish resources and fish habit in general. This means, to mention but a few potential mitigation measures, routing supply vessels away from areas where fishing is occurring, eliminating deleterious discharges in accordance with the OWTG or bringing all waste to shore, timing VSPs to avoid potential impact on fish larvae and fish spawning activity and using water based drilling muds.[3]	BEPCo is committed to fulfilling all commitments made in the EA Report and will comply with CNSOPB conditions of approval. As indicated in Section 5.2.2.6 of the EA Report, BEPCo will employ an Environmental/Fisheries Observer onboard during drilling operations to monitor interactions with fishing vessels and serve as a liaison between the MODU and fishing boats. Environmental compliance monitoring will be conducted to verify compliance with applicable legislation, including the Offshore Waste Treatment Guidelines, and conditions of regulatory approvals.	The CNSOPB will continue with its approach to regulate activities in a manner that minimizes the impact on the fishery, marine fish resources and fish habit.
SPECIES AT RISK		
There is inadequate consideration given to the potential impacts of the project on species at risk. DFO trawl survey data suggests that the proposed drilling area is a potentially important habitat for cusk (listed by the COSEWIC). The Shelf edge is a migration corridor for large pelagic fishes, cetaceans and sea turtles, many of which are considered at risk by COSEWIC.[2]	BEPCo recognizes the potential for species at risk to occur in the vicinity of EL 2407, and as such, there is much attention given in the EA Report to fish, mammal, turtle and bird species at risk. Additional information on species at risk relative to the Project is found in Appendix 2 of the addendum.	Assessment of Species at Risk is an important aspect of the EA process. The CNSOPB has reviewed the material provided in the EA, as well as the supplemental information provided in the addendum, and is satisfied that it is adequate.
For designated species that may frequent the project area seasonal maps of their range, distributions and densities should be provided. Location information	Additional information on species at risk related to this project is provided in Appendix 2 of the addendum.	See above response

[2] World Wildlife Fund

COMMENT	PROPONENT'S RESPONSE	CNSOPB'S RESPONSE
from the text of SARA and COSEWIC documents is also missing.[1]		
Status of the Atlantic leatherback turtle population can be obtained from DFO staff working on the recovery strategy. The strategy will identify critical habitat, DFO should be contacted to find out the status of this.[1]	The DFO Pacific Region has published a draft of the leatherback Recovery Strategy Plan. DFO in Atlantic Canada is still in a consultative process and has not yet published a recovery strategy. Additional information on species at risk related to this project is provided in Appendix 2 of the addendum.	The CNSOPB is involved in the DFO consultation process for the Leatherback Turtle Recovery Strategy Plan.
How much critical habitat is there for all COSEWIC and SARA listed species is within EL 2407? This should be mapped and analyzed for all species.[1]	Further information on species at risk related to the project is provided in Appendix 2 of the addendum. Note that "critical habitat" has a legal significance and definition under *SARA*, and to date, no critical habitat has been identified for any listed species occurring offshore Nova Scotia. The study team is therefore careful in the use of this term.	No critical habitat has been identified for any listed species occurring offshore Nova Scotia, as defined in the SARA.
MARINE BIRDS		
The response of seabirds to seismic has not been studied extensively. The response of seabirds to seismic testing should be researched further, and might give clues to broader ecosystem impacts of noise pollution. [1]	There have been no reports of seabird impacts from OGOP observers on full exploration seismic surveys. Stemp (1985) found no evidence that a seismic program in the Davis Strait area had resulted in mortality or distributional effects on marine birds. Evans *et al.* (1993) noted that there was no evidence to suggest that seabirds were either attracted to or repelled by seismic testing in the Irish Sea. Turnpenny and Nedwell (1994) refer to data in which trained observers reported no ill effects on	There is no evidence to suggest that there would be likely significant impacts from seismic on seabirds. However, few peer reviewed studies on the impacts of seabirds and seismic have been conducted and none have been conclusive. Further research on this topic is outside of the scope of this EA.

[1]Ecology Action Centre

COMMENT	PROPONENT'S RESPONSE	CNSOPB'S RESPONSE
	guillemot, fulmar and Kittiwake species that were monitored during airgun seismic surveys.	
The lack of clear regulatory response to flaring on the Nova Scotian offshore is of particular concern. In the case of this project, flaring may be for a small amount of time, but should production drilling begin, more flaring would be anticipated. The cumulative impact of this activity could have significant effects on seabird populations.[1]	Daily bird monitoring on three SOEP platforms found no evidence of high mortality associated with long-term production flaring (Hurley 2000).	It is the CNSOPB's opinion that any flaring that may be associated with this project will not have a significant impact on seabird populations. Production activities are outside of the scope of this exploratory drilling project. If BEPCo is successful and it submits a Development application in the future, a separate environmental assessment would be required for the development project.
Light pollution is not discussed in sufficient detail in the EA document.[1]	Effects on seabirds from lighting/flaring are described in Table 3.3 of the EA and in responses provided to EC-28 and EC-32 in the addendum.	It is the CNSOPB's opinion that light pollution has been adequately assessed.
The amount of light emitted by vessels and structures should be minimized. Light should be focused on work areas and down-shaded as much as possible. Monitoring should be initiated to estimate bird densities around platforms relative to adjacent areas. Estimates of damage and deaths caused to birds should be made through monitoring. Protocols should be put in place for the handling and collection of injured and dead birds.[1]	Refer to response provided for EC-28 in the addendum. Monitoring for seabirds is conducted on oil and gas projects and has been included in follow-up and monitoring commitments in the EA Report. Refer to response provided for EC-28.	One of the roles for the Fisheries Liaison Observer (FLO) is monitoring seabirds and recording observations. BEPCo will be required to adhere to the protocol described in Williams and Chardine's brochure entitled, *The Leach's Storm Petrel: General Information and Handling Instructions*.
Flaring should be kept at a minimum to reduce impacts on birds.	Refer to response provided for EC-28 in the addendum.	Flaring is generally a short term activity (a few hours to a few days maximum) for a drilling program, and would only occur if significant

[1] Ecology Action Centre

COMMENT	PROPONENT'S RESPONSE	CNSOPB'S RESPONSE
Flaring should only occur at times when high bird densities, particularly of species highly attracted to light, are not present.[1]		hydrocarbons are found and the well is tested.
BENTHIC SPECIES		
The dismissal of impacts on benthic invertebrates by the proponent based on an unreleased study is unacceptable. The results of the DFO study will be released during this consultation period. The impacts on marine invertebrates must be incorporated into mitigation measures. [1]	The DFO data have been released and concur with the EA Report predictions. No change to the EA Report or proposed mitigation is required.	The results of the DFO study are incorporated into the analysis for this CSR.
MARINE FISH		
There are additional studies, not referenced in the EA, on the effects on fish. Kozak and Shparkovski (1991), found that water-based clay fluids effected changes in respiration rates and heartbeat in salmon fry exposed to concentrations of between 2 and 15 milligrams per litre (mg/l) for a couple of minutes and led to "reduced survival" in cod and flounder exposed to concentrations of 5 mg/l for 10 to 30 days. Shparkovski et al (1989) had earlier reported "threshold changes in respiratory and cardiac activities" in cod, salmon, haddock and rays exposed for 2 to 5 minutes to 15-40mg/l concentrations of "water-based clay-bentonite fluids". Another Russian research paper (1994) described 50% mortality in salmon fry and amphipods exposed for between 48 and 96 hours to	Salmon fry are not an issue in offshore waters of Nova Scotia. Refer to Hannah *et al*. (2003) and a description of oceanography currents is provided in Appendix A of the EA Report. Drilling fluids are not static in the water column for periods of 48 hours to 30 days. Laboratory analyses often conservatively overexpose organisms to concentrations that do not necessarily occur *in situ*, including the work conducted by Cranford.	The EA and response provided by BEPCo adequately address this comment.

[1] Ecology Action Centre

COMMENT	PROPONENT'S RESPONSE	CNSOPB'S RESPONSE
5-22mg/l concentrations of water-based lignosulfonate and ammonium drilling fluids. [1]		
ECOSYSTEM ANALYSIS		
Basic data parameters are missing to assess the ecosystem effects of this proposed drilling program. There is a lack of understanding in this document of the various species populations. An attempt should be made to represent and analyze the existence of populations of species and what percentage of the population inhabits the project area. There should also be information on the importance of the local or regional population to the national or global population. Without this information how can the impact of the project on the "population" be assessed? [1]	The local effect of drilling is not on a regional or global scale. The Scotian Slope habitat is as extensive as the slope itself, therefore the populations being considered are also extensive.	The CNSOPB considers the information contained in the EA and responses an adequate assessment of the ecosystem effects of this proposed drilling program.
There is no mapped data of seasonal oceanographic and hydrographic conditions for EL 2407 and surrounding region in the body the EA. These variables are important in building a picture of the marine ecosystem and understanding the distribution of many species. It would be useful to see the regional movements of these features mapped in relation to EL2407. [1]	Detailed information on the physical oceanography and hydrography in the vicinity of EL2407 are included in Section 2 of Appendix A of the EA Report.	The CNSOPB considers the oceanographic and hydrographic information provided to be adequate for the purpose of this EA.
There is no data on phytoplankton and primary productivity. No effort was made to map the spatial and temporal extent of fish eggs and larvae based on what is known. The long term implication of production drilling in areas such as this is not addressed No food chain energy analysis to understand how the loss of phytoplankton and zooplankton	The importance of phytoplankton, zooplankton and ichthyoplankton in aquatic ecosystems is well understood. By nature, these organisms are ubiquitous and on a distributional scale overwhelm the space occupied by a single MODU for a short period of time. The EA Report focuses on those VECs that have potential to be affected in a detrimental manner. Ichthyoplankton are addressed	The CNSOPB is satisfied that the EA provides sufficient information related to potential impacts on phytoplankton and zooplankton.

[1] Ecology Action Centre

[1] Ecology Action Centre

COMMENT	PROPONENT'S RESPONSE	CNSOPB'S RESPONSE
(including fish larvae) may affect smaller pelagics, groundfish, large pelagics.[1]	in the EA Report and the text is not diminished by the lack of an illustration. This EA Report assesses an exploration program. If a production project were developed subsequently, then another EA would be undertaken on that project	
No marine ecosystem model is provided to show the foodweb and interdependence of species, both flora and fauna and chemical components of seawater.[1]	Ecosystem modeling will not change the outcome of the EA Report. If the VECs are not significantly affected, then the ecosystem remains intact.	The CNSOPB is satisfied that appropriate VECs have been selected and analyzed for potential impact. As there were no likely significant impacts found, the ecosystem is expected to remain intact.
AIR EMISSIONS		
Proponent must provide a greenhouse gas emissions budget that will be produced during this project. and in the long term (i.e. should commercial amounts of oil and gas be discovered)	Further information on air emissions associated with the project is contained in Appendix 7 of the addendum.	The CSR contains further analysis of air emissions, taking into consideration advice from EC.
The amount of greenhouse gas emissions associated with large industrial projects such as this are substantial, and should be quantified before being dismissed as having no impact.[1]	Further information on air emissions associated with the project is contained in Appendix 7. Note that the study team would not characterize this project as a "large industrial project". This would be the case for a production project, but not for drilling, due to its temporary nature.	See previous comment.
Reports on air emissions submitted to the CNSOPB must be subject to public scrutiny.[1]	BEPCo will comply with CNSOPB protocols with respect to this issue.	All EEM reports, including any on air emission, will be public documents.
Reduction of emissions can be obtained by reducing, as much as possible, vessel and helicopter traffic to the MODU.[1]	Due to the cost and downtime associated with travel to the MODU, BEPCo's drilling contractor will plan these trips to be as efficient and minimal as possible.	Comment and response are noted.
The use of an anchored semi-submersible will also reduce emissions.[1]	The ratio of dynamically positioned MODUs, as compared to moored MODUs, is 9 to 1. BEPCo therefore has a 90% probability of the available MODUs at the time of the drilling program being dynamically positioned.	Comment noted. Drilling unit selection will be based on the availability of suitable MODU`s at the project time.
If technologically possible, air emissions from the	It is BEPCo's understanding that due to the physical	The air shed monitoring station on Sable Island

COMMENT	PROPONENT'S RESPONSE	CNSOPB'S RESPONSE
project should be monitored from the air shed monitoring program on Sable Island.[1]	distance from the project location to Sable Island and predominant wind directions, as well as the limited nature of emissions from the project, there is limited potential for air emissions from the project to be monitored from Sable Island.	runs continuously and analysis of the data includes attempts to identify the source of abnormalities.
Assess green house gas (GHG) emissions from all equipment and fugitive emissions annually, to provide an annual GHG emissions inventory. [1]	Further information on air emissions associated with the project is contained in Appendix 7.	BEPCo will be required to adhere to the OWTG, which state that GHG must be calculated annually and submitted to the CNSOPB's the Chief Conservation Officer.
Vessels participating in the project should adhere to MARPOL Annex VI guidelines regarding air pollution from ships.[1]	Vessels associated with this project will comply with all required regulations and guidelines.	All fixed and mobile drilling units are subject to MARPOL, Annex VI requirements.
Emissions from diesel generators aboard the MODU should be reduced by installing low NOx burners.[1]	Further information on air emissions associated with the project is contained in Appendix 7.	Emissions (including NOx) from MODUs will have to be in compliance with MARPOL Annex VI. The coming into force date is 19 May, 2005. This is the appropriate international standard and it is not appropriate to require measures above that for the short duration of this project.
FLARING		
Flaring occurred intermittently for several years at the Thebault Platform, with little regulatory response. Fishermen and other observers were frustrated that the CNSOPB responded to their concerns by stating that air quality issues were outside the purview of the Board. This lack of regulatory response is clearly unacceptable. Flaring that lasts longer than anticipated in this EA must be subject to regulatory action.[1]	Flaring is a necessary safety component of oil and gas activities and will only be conducted when required during drilling operations (*i.e.,* during well testing). It is important for reviewers to remember that SOEP is a long-term production facility, as compared to a 30 to 90 day drilling program, which may occur a maximum of six times over a five year period.	The CNSOPB, with advice from EC, has addressed air quality issues in the CSR, and mitigation as outlined in the CSR will be made a condition of authorization of the activity.
Reduce flaring as much as possible, with continuous venting being unacceptable.[1]	Flaring is a necessary safety component of oil and gas activities and will only be conducted when required during drilling operations (*i.e.,* during well testing).	Note that Flaring is only conducted during well testing operations. There may also be short term venting of hydrocarbons during well control measures as a necessary safety component of a

[1] Ecology Action Centre

COMMENT	PROPONENT'S RESPONSE	CNSOPB'S RESPONSE
		drilling program.
MUDS, CUTTING AND DISCHARGES		
A range of detrimental effects on benthos, bivalves and fish have been associated with water-based drilling fluids and cuttings. The EA has minimized the potential area that could be affected and the impacts.[1]	BEPCo will meet the NEB, CNSOPB and CNOPB *Guidelines Respecting the Selection of Chemicals Intended to be Used in Conjunction with Offshore Drilling & Production Activities on Frontier Lands* (1999). Please refer also to responses provided for EC-7 and EC-10 in the addendum.	Based on previous experience, in the CNSOPB's opinion the potential affected area and the impacts have been conservatively assessed. Also, components of the drilling fluid will have to meet the requirements of the OCSG.
In some cases, elevated concentrations of barium in tissues of some polychaetes, brittlestars, and bivalves were detected as far as 1600 m from a single well discharging WBM (Mariani et al. 1980).[1]	Bioassays were conducted at the SOEP project site on deposit and detritivores species. Effects were limited to within 500 m. This result agrees with global studies that typically effects are limited to within 500 m of a production platform.	The CNSOPB is satisfied that the effects predictions presented in the EA are consistent with other studies conducted in this region.
Increases in a suite of trace metals associated with drilling fluids have been observed at substantial distances from single well sites. At deeper locations (>80 m), the concentration of some metals (i.e. Cd and Hg) exceeded levels known to cause effects several years after drilling had ceased (Peterson et al., 1999) in the Gulf of Mexico.[1]	No change in metal concentrations in surficial sediment was found by the ExxonMobil EEM surveys or by DFO surveys around the SOEP project, which is a production project. The reviewer has noted increases in metals, but does not elaborate on the medium or significance of the increases.	There are low concentrations of trace metals associated with the barite used in drilling fluids. Studies, including these from multi-well projects have not found biological impact from trace metals associated with drilling fluids. The allowable concentration for discharge of heavy metals is not presently detailed in the OWTG. The CNSOPB will be conducting further investigation to ensure internationally acceptable levels are not exceeded.
The cuttings pile could be created by 6 wells drilled over a five-year period. If this is the case, the cuttings pile will be more than the predicted radius of 10 - 40m (an area of 300 – 5000m^2 for a single well scenario) and this increase in impacted area should be factored in to the ongoing monitoring program. The SOEP developed a cuttings pile that had a maximum radius of 75 m from the drill site (Hurley, 2000). [1]	The 6 wells will not be drilled in the same hole (*i.e.,* there could be 6 distinct cuttings piles if all 6 wells were drilled). There is no drilling template as per production drilling.	The proposed wells will all be drilled at different locations. The EA adequately assessed the impact for the 6 distinct wells.

COMMENT	PROPONENT'S RESPONSE	CNSOPB'S RESPONSE
Water based drilling fluid solids can be transported over long distances (35-65 km) (Neff et al. 1989). The EA states that sediment plumes from a surface release of WBM/SBM are thought to dissipate rapidly and would therefore have no significant effect to the benthic community. On the CoPan site, flocculated drilling wastes were found in the benthic boundary layer during drilling operations as far as 10 km away from the rig (Muschenheim et al., 1995).[1]	Review Hannah *et al.* 2003 which updates the evaluation of the bblt model. The material observed at COPAN was not confirmed to be drilling waste, but only assumed. This is clearly stated in the referenced article. Of interest, this same material was observed two years after the final overboard discharge of drill wastes at COPAN, which suggests that the material is not of drill waste origin. Accumulations of floc have never been observed by video surveys. The current regime is very high at peak tides and variable on Sable Island Bank.	The CoPan project was a multi-well development project, not distinct exploratory wells. There are significant differences between the BEPCo proposed activities and the CoPan project. In addition, the water depth in the BEPCo location is over 1000 metres deeper than CoPan. The CNSOPB is satisfied with the analysis of the fate and effects of the WBM/SBM in the EA.
The exact components of the water-based drilling muds proposed for use in this drilling program should be identified in the EA to assess if any highly toxic substances are included.[1]	BEPCo has selected a preferred drilling mud system for the initial well, but as the EA Report covers a maximum of six wells over a five year period, it is not possible at this stage to indicate the systems that may be used for each of these future wells. As well, the initial system selected is for WBM and future wells could require the use of SBM. For this reason, the level of detail being requested at this stage is more appropriate when the Authorization to Drill a Well (ADW) is sought. In the EA Report, BEPCo has provided typical volumes of discharge for the muds and cuttings, and has committed to being in full compliance with the Offshore Chemical Selection Guidelines and the Offshore Waste Treatment Guidelines. These commitments are sufficient for the purposes of assessing the environmental effects of the proposed project. The impact of drill waste discharges on marine benthos has been fully assessed in the EA Report and determined not to result in likely, significant,	At this early stage in the project, BEPCo cannot select the exact components of drilling fluid, as a drilling fluids company has not been contracted. However, in its EA BEPCo has indicated that the first well will probably be drilled using water-based muds. The engineering and design of the actual mud system will be submitted to the CNSOPB for review once BEPCo prepares and submits an application for Authority to Drill a Well. The CNSOPB will then review BEPCo's drilling fluids program. Also, as with all authorizations, all components of the drilling fluids program must meet the requirements of the OCSG as a condition of approval.

[1] Ecology Action Centre

COMMENT	PROPONENT'S RESPONSE	CNSOPB'S RESPONSE
	adverse effects. Refer also to response provided for EC-7.	
Concerns expressed about the effect of drilling muds on the environment.[1]	This issue has been fully assessed in the EA Report and through additional information provided in the addendum.	The CNSOPB is satisfied that the EA adequately addresses the effect of drilling mud on the environment.
NOISE		
There were many broad statements provided on noise in the ocean.	Refer to Appendix 3 of the addendum for additional information on noise associated with the project.	No response needed.
There were many comments on reviewing of observations made in other studies on marine mammals relative to seismic activities.	This is a review of observations on marine mammals relative to seismic activities. The effects of the proposed VSP survey on marine mammals were fully assessed in Section 5.2.3.5 of the EA Report. No further response from BEPCo is required.	No response needed.
Stone (2003) included results of surveys carried out when lower impact noise was being emitted (180 cu inch or less), which are of interest because of the lower level but chronic noise pollution that will be associated with this project, and because VSP's will have lower sonic impact than full-array seismic. In this study, changes in sightings and behaviour were less dramatic than for seismic exploration, but there were significant findings. For all species tested, fewer pods were observed to be heading towards the vessel during these activities, and some whale species breached and jumped more often. When all cetaceans were combined, they were found to be more likely to remain submerged during when "on site" activities were occurring. These results demonstrate that noise other than seismic must be	This is an opinion and a review of observations on marine mammals relative to seismic activities. The effects of the proposed VSP survey on marine mammals were fully assessed in Section 5.2.3.5 of the EA Report. No further response from BEPCo is required.	The CNSOPB is satisfied that the EA adequately addresses the effects of the proposed VSP surveys.

COMMENT	PROPONENT'S RESPONSE	CNSOPB'S RESPONSE
included in assessment for impact on marine mammals.[1]		
There is limited information on the effects of noise on sea turtles. Effects of chronic noise pollution on turtles are not known at this time. Because turtles, especially leatherback turtles, are at extremely low abundances, it is important that impact on these animals be minimized by not carrying out seismic during their migration throughout the region, and minimizing other noisy activities at these times.	Noise generated from this project will not extend regionally, as inferred from this comment. The VSP survey activities will extend a maximum of 2500 m from the well site, creating a localized disturbance. This is quite different in scale from larger, regional 2D and 3D surveys. The presence of leatherback turtles has been noted to include the Scotian Slope, Scotian Shelf, the Laurentian Channel and Grand Banks.	VSP surveys are of much shorter duration than 2D or 3D surveys and extend only a short distance from the MODU. Although VSPs are very localized surveys, an Environmental/Fisheries Observer will be onboard the MODU to monitor for marine mammals. If endangered species are observed within 500m the survey will be discontinued until the mammal leaves the area. As with all such projects, all other standard mitigation measures will be applied as conditions of authorization, including a ramp-up at the start of the survey.
Shelf break areas are beginning to be recognized as important habitats for fish and other species (Worm et al. 2003). Because of the significance of these areas, and reduced abundance of local fish stocks, care should be taken to minimize and understand impacts of ocean noise on fish.	The presence/attraction of fish to offshore structures is well documented and the decommissioning of offshore platforms even becomes an issue with respect to loss of fish habitat. Review Love *et al.* (2003) as one example. Waters beyond 500 m are not as heavily exploited as the shelf waters. The significance is fishing gear limitations which will ultimately adapt. The effects of the project on marine fish have been assessed in the EA Report. No significant adverse effects are likely as a result of the project.	The impacts of the project on marine fish have been adequately addressed. The CNSOPB is working with DFO and other government agencies to address impacts of seismic on marine life through the development of a Canadian Standard for mitigation. The CNSOPB will ensure that this project adheres to the requirements of this standard.
Fish behaviour may change in response to noise levels, lower than the proponent's threshold level of impact. Fish will also move from areas where seismic testing is occurring, migrating as much as 40 km to avoid the noise, with catches not returning to pre-seismic levels for more than 5 days after exposure (Engas et al. 1996). At seismic noise levels, fish ears suffer permanent damage if they are	The potential effects of the project on marine fish are addressed in the EA Report. Further information on noise emissions from the project are provided in Appendix 3 of the addendum.	See above response.

[1] Ecology Action Centre

COMMENT	PROPONENT'S RESPONSE	CNSOPB'S RESPONSE
within a 5-50 metre radius of airguns (McCauley et al. 2003), but there is little knowledge of how chronic noise pollution affects fish hearing. Fish eggs and larvae are known to be killed within 2-5 metre radius of air guns (Dalen and Knutsen, 1985), but, again, impacts of chronic noise pollution on fish and larvae are unknown. [1]		
Squid have been demonstrated a startle response at levels of 174 dB re Pa, and an alarm response at 156 - 161 dB. The impacts of noise on squid and other pelagic invertebrates are not assessed in the EA.[1]	McCauley *et al.* (2000) noted startle response to first start up at a received airgun level of 163dB re 1 μPa^2.s, but this response was not observed for similar or greater levels during ramping-up. Startle response was recorded as airgun signal increased with effort most noticeable above 145 to 150dB re 1 μPa^2.s; possible trend observed to movement towards water surface as airgun approached. Note that experimental cages for these studies were 10x6x3m and floating at the surface. Squid spend the daylight hours near the bottom of the ocean, seeming to prefer areas where the bottom temperature is 6 to 7°C or greater. At night they tend to disperse upward, a behaviour characteristic which is vital to squid jigging in offshore areas. McCauley *et al.* (2000) noted evidence of increased swimming speed as the airgun approached, then swimming slowed down at airgun signals of 155 dB re 1 μPa^2.s	BEPCo has provided additional information. The CNSOPB is satisfied that the EA adequately addresses the effects of the proposed VSP surveys.
Proponent must provide more information on noise pollution that will be created by project. The EA is lacking in information on noise pollution associated with drilling activities other than seismic testing.[1]	Refer to Appendix 3 of the addendum for additional information on noise associated with the project.	BEPCo provided additional information on noise from drilling in the addendum to their EA. The CNSOPB is satisfied that the EA adequately addresses the effects of the proposed VSP surveys.
Specific times, pulse frequency, and number of seismic profiles to be performed by proponent must	Information on timing is provided on page 2-7 in the EA Report. The pulse frequency is usually less than	The CNSOPB is satisfied that the EA adequately addresses the effects of the proposed VSP

[1] Ecology Action Centre
[1]Ecology Action Centre

COMMENT	PROPONENT'S RESPONSE	CNSOPB'S RESPONSE
be given in order to evaluate impacts on ecosystem.[1]	1 kHz with most of the energy at 50Hz. The number of profiles is not known at this time. For zero offset surveys, the airguns are fired four to eight times for 20 seconds, followed by a 5 to 20 minute quiet time. This pattern continues until the survey is done. Considering that VSP surveys use smaller airgun arrays compared to those used for conventional 2D and 3D surveys, the pulse period could be approximately 78 to 136 msec. The exact nature of the VSP survey will only be determined immediately prior to its conduct. For this reason, generic or typical VSP information is provided and assessed in the EA Report.	surveys.
Ambient acoustic levels are not given, making it impossible to assess how proposed project will contribute to noise levels in the area.[1]	Refer to Appendix 3 of the addendum for additional information on noise associated with the project.	BEPCo provided addition information on ambient conditions in its addendum.
Conservative estimates of sound propagation must be made for chronic noise pollution and seismic surveys, incorporating the depth of the area in question and other noises present. Other studies have shown greater noise propagation than estimated by the proponent.[1]	Page 5-34 of the EA Report describes array directivity.	The CNSOPB is satisfied that appropriate assessment of impacts from noise has been conducted.
The minimal noise level that causes behavioural change in marine mammals (115 dB re 1 μPa; described in Thompson et al. 2000) should be used to calculate the spatial boundary of noise pollution caused by the project.[1]	The determination of safe exposure levels is a matter of scientific debate and research. There is no reliable data to suggest that supply vessel and drilling noise adversely affects marine mammals. Refer to Appendix 3 of the addendum for additional information on noise associated with the project.	The CNSOPB is satisfied that an appropriate assessment of impacts from noise has been conducted.
No data is provided on ecosystem effects of chronic noise pollution and seismic testing.[1]	Refer to Appendix 3 of this addendum for additional information on noise associated with the project. Dominant noise is attributed to marine traffic. This Project will result in negligible increases to marine	See above response.

[1] Ecology Action Centre

COMMENT	PROPONENT'S RESPONSE	CNSOPB'S RESPONSE
	traffic in the study area.	
The proponent predicts no significant impacts of noise pollution on marine animals, and no significant cumulative impacts on the marine ecosystem. Given the growing concern regarding the impacts of noise pollution, especially in light of the presence of endangered species in the study area, we predict that the risk to marine life are being under-estimated. [1]	This statement is in the opinion of the EAC reviewer. Refer to Appendix 3 of the addendum for additional information on noise associated with the project.	See above response.
We predict that chronic and cumulative noise pollution will result in impacts on marine animals, with possible ecosystem effects.[1]	This statement is the opinion of the EAC reviewer. Refer to Appendix 3 of the addendum for additional information on noise associated with the project.	The CNSOPB is satisfied that this project is not likely to have adverse environmental effects.
All measures must be taken to reduce impacts on Species at Risk and other species sensitive to noise.[1]	Appropriate mitigation measures are stated in the EA Report.	Appropriate mitigation will be in place, if the activity is authorized.
An independent assessment of the noise levels proposed for seismic should be carried out to determine the lowest possible noise levels required for this activity.[1]	This statement is in the opinion of the EAC reviewer. Refer to Appendix 3 of the addendum for additional information on noise associated with the project.	Appropriate mitigation will be in place, if the activity is authorized.
The boundaries (temporal and spatial) of the impact of noise created by seismic and ongoing drilling will be further than anticipated.[1]	Refer to Appendix 3 of the addendum for additional information on noise associated with the project.	The CNSOPB is of the opinion that the appropriate boundaries are being applied.
VSPs are part of the proponent's EA. Previous to this, a separate environmental screening was performed for VSP's. The more holistic approach taken by the proponent must not result in less regulatory scrutiny or control over timing, location, and acoustic power of proposed surveys. Any changes in proposed activities should require a screening.[1]	VSPs (as a component of exploration drilling) were included within the scope of the project being assessed to avoid inefficient duplication of the regulatory process. As with any deviation from a project description, if changes in the VSP are required, BEPCo will consult with the CNSOPB to determine the appropriate course of action.	The CNSOPB is of the opinion that it is more appropriate to consider all aspects of the project in the CSR. This will not result in any less scrutiny. Activities outside the scope of the CSR will require assessment prior to being included in the project.
Seismic activities must comply with all rules regarding avoiding oil spill prevention and handling of injured birds.[1]	Streamer arrangement for a VSP is different than for conventional 2D and 3D surveys. They are downhole.	The seismic activities (VSP) will be subject to the same provisions respecting oil spills and handling of birds.

COMMENT	PROPONENT'S RESPONSE	CNSOPB'S RESPONSE
Seismic activities must conform with DFO recommendations arising from the ongoing national consultation process.[1]	BEPCo has addressed the specific comments raised by DFO with respect to the EA Report.	The CNSOPB is working with DFO, other Boards, and provincial governments to develop a Canadian Standard for mitigation. The CNSOPB will ensure this project adheres to the requirements of this standard.
The use of a semi-submersible rig will reduce noise pollution produced by the project substantially.[1]	Refer to Appendix 5 of the addendum for further information on the alternative means for the project. The decision of the type of MODU to be used will be based on availability and project schedule considerations. For this reason, the effects of both drillships and semi-submersible rigs were assessed in the EA Report.	The CNSOPB is satisfied that the use of either a semi-submersible or a drill ship is not likely to result in adverse effects; therefore either would be acceptable.
Timing of seismic in relation to concentrations, migrations, and timing of reproduction of marine animals is critical to reducing impacts of this activity, as is a reduction in the noise levels proposed. [18]	Information on marine mammal concentrations, migrations and reproduction is virtually unknown in Atlantic Canada, with the exception of some information on North Atlantic right whale and northern bottlenose whales. Cetacean presence information is seasonal at best. Regardless, with mitigation in place as identified in the EA Report, the project is unlikely to result in significant adverse environmental effects for marine mammals.	The CNSOPB is satisfied that, with the required mitigation, noise from the project is not likely to result in significant adverse environmental effects.
Trained, independent marine mammal observers must be placed on board ships and rigs before, during, and after seismic testing in order to test whether the predicted impacts are indeed insignificant. A trained individual will be required to deploy a hydrophone to listen for marine mammal activity in the vicinity before seismic testing begins. [1]	BEPCo will comply with the conditions imposed by its approval from the CNSOPB.	BEPCo has committed to having an appropriately trained Environmental/Fisheries Observer on board the MODU at all times while it is onsite. This will be a condition of authorization, if the activity is approved. One of the responsibilities of the observer will be to document marine mammal and seabird observations, and determine whether there are any endangered species of marine mammals within the 500 m safety zone during VSP surveys. The CNSOPB is satisfied that visual observation with the conditions noted below is adequate and will not require passive acoustic

[1] Ecology Action Centre
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COMMENT	PROPONENT'S RESPONSE	CNSOPB'S RESPONSE
		monitoring.
Ramp up procedures must be *required before* all seismic activity. A statistically valid observation protocol must be carried out to help determine the effectiveness of this controversial mitigation measure.[1]	As required by the CNSOPB, ramp-up procedures will be used at the initiation of each VSP survey.	The CNSOPB will require ramp-up prior to commencing all VSP surveys.
If marine mammals are sighted, testing will not proceed until the animal has left the test area.[1]	BEPCo will comply with the conditions imposed by its approval from the CNSOPB.	The CNSOPB will require that if endangered marine mammals are sighted, testing will not proceed until the animal has left the 500 m safety zone.
In order to aid in sighting marine mammals, seismic will not take place in times of low visibility.[1]	VSPs are conducted during daylight hours due to proximity to the MODU.	In the event of poor visibility, considering that VSPs are localized and of short duration, ramping –up the air guns is deemed to be adequate mitigation.
Acoustic monitoring stations must be set up to determine the propagation of drilling and seismic noise.[1]	BEPCo will comply with the conditions imposed by its approval from the CNSOPB.	Acoustic monitoring has been conducted in conjunction with 2D and 3D seismic programs. The CNSOPB does not consider it necessary to require acoustic monitoring for exploratory drilling programs or VSPs.
SPILLS		
Reducing accidental spills, leaks, and venting must become a top priority for the CNSOPB, with adequate monitoring to ensure projects remain within GHG targets. [1]	Preventing accidental events is also a priority for BEPCo from an operational, safety and environmental perspective. BEPCo will comply with all industry standards and regulations with respect to spill prevention.	Preventing accidental spills, leaks and venting has been a top priority of the CNSOPB and will continue to be so.
Damage to the environment from an oil spill is of concern.[1]	This issue has been fully assessed in the EA Report and through additional information provided in this addendum.	The CNSOPB agrees than environmental impacts from spills are a concern. There is a low probability of a significant spill occurring, however, appropriate spill prevention, preparedness and response capability is required by the CNSOPB as a condition of all

[1] Ecology Action Centre

COMMENT	PROPONENT'S RESPONSE	CNSOPB'S RESPONSE
		authorizations. Also, discoveries offshore Nova Scotia to date are primarily gas, not oil, which reduces the probability of oil spills.
CUMULATIVE EFFECTS		
There is no consideration of the possible effects of the potential 6 wells on the marine ecosystem. A critical issue with multiple wells is whether threshold levels of discharge and toxins are reached at important areas with high densities of organisms (Boudreau et al. 1999). [1]	BEPCo has assessed the effects of the maximum number of wells that could be drilled during the proposed project. The number of wells to be drilled over the five-year program will likely be less than the six wells described in the EA Report, but an aggressive drilling schedule was presented in order to represent the worst case scenario. As stated in Section 2.4.1.1 of the EA Report, modeling results for drilling discharges were conducted and presented for a single well, as the discharge is a single point source emission, but the total volumes of discharges could be six times this volume. Under routine conditions, the effects of an exploration drilling program are short-term and localized, with no potential for likely adverse significant effects even considered cumulatively. The most persistent of all potential emissions and discharges are drill wastes. Other emissions, such as noise, lighting, and air emissions, will only be present in the environment for the period of time during which the drilling occurs and are also unlikely to cause any resulting long-term effects (*e.g.,* any disturbance to species as a result of noise would cease with the end of the drilling program). Simultaneous drilling of more than one well within the area of interest will not occur. For drilling discharges (other than a surface release of WBM), they will be localized within less than a kilometre of the well site and will not accumulate with discharges from other wells due to the distance between wells. Even with six wells drilled within the area of interest, no likely adverse significant impacts are predicted for any	The effects of the project have been assessed for the scenario that would have the most environmental impact; that is drilling all 6 proposed wells over a five year period. The effects of exploratory drilling are generally short term and very localized, and the CNSOPB is satisfied the environmental effects have been adequately assessed.

COMMENT	PROPONENT'S RESPONSE	CNSOPB'S RESPONSE
	VEC, including marine benthos. Marine benthos is the VEC with the greatest potential for adverse effects as a result of drill waste discharge. Refer also to responses provided for DfO-87 and EC-73 in the addendum. The physical extent of project effects would be greater in the event of an accidental spill or blowout. The likelihood of a worst case event (*i.e.,* a 100 barrel diesel spill) is one every 1650 years (Table 2.7 of the EA Report). Given the small likelihood of this event occurring, the EA does not assess the impacts, including cumulative effects, of multiple worst case accidental events. As stated above, the greatest potential for cumulative effects to result from a six well program versus a single well program is related to drilling discharges and subsequent effects on marine benthos. As stated in Section 5.3.1.1 of the EA Report: "Although discharges were modeled for a single well, the cumulative effect (*e.g.,* 800 m radius for each of the 6 potential exploration wells) is not considered to affect a substantial area of habitat within EL 2407." In addition, there are no other oil and gas projects identified that are predicted to overlap spatially or temporally with the project	
The EA does not assess cumulative effects of different operations from the project that could combine to affect marine ecosystem and species health. For example, what is the potential of cumulative effects on marine seabirds from gas flaring, attraction to offshore lights, and operations that occur during important migratory times?[1]	Cumulative effects on all VECs, including marine birds, are described in Section 5.3.5 of the EA Report. Effects of the project on ecosystem health are described in Section 5.2.8 of the EA Report. Refer also to response provided for EC-32 in the addendum	The CNSOPB is satisfied that cumulative effects have been adequately assessed.

COMMENT	PROPONENT'S RESPONSE	CNSOPB'S RESPONSE
Cumulative impacts of chronic noise pollution on species at risk are also of serious concern. Should this project proceed to production, the anticipated effects noise must also be considered. [1]	The EA Report addresses an exploration project and is not required to consider an eventual production project. This future project would be considered in a separate EA. Refer to Appendix 3 of this addendum for further information on noise associated with the project.	Production activities are outside of the scope of this project.
DATA DEFICIENCIES		
Consultants are putting their own spin on the science, for example the minimizing of the impact of seismic on snowcrab despite the fact that the final report has not been publicly released.[1]	DFO publicly released the results of the snowcrab study, which concur with the information noted in the EA Report.	The CNSOPB, in consultation with DFO, has reviewed the assessment and is satisfied that the comments in the CSR appropriately represent the scientific studies conducted to date.
PUBLIC PARTICIPATION		
The Ecology Action Centre conducted a series of preliminary interviews with 'stakeholders'. Due to time restrictions, successful contact was made with only 7 organizations. Recommendations from the interviews included: - Only 1 respondent was aware of details on the CS process. - Longer review period needed, 60 days suggested. - Should be wider notification and distribution of offshore projects. A listserve should be created by the CNSOPB. While some fisheries organizations were notified of the project through the CNSOPB FAC, others weren't, and conservation organizations were not contacted. - The advertisement that appeared in the newspapers should include a map of the project area.	Comment noted. No further response required No response required from BEPCo. No response required from BEPCo. The timelines for public review are determined by the Responsible Authority and not by the proponent. No response required from BEPCo. BEPCo is aware that notifications related to the environmental assessment were posted on the CNSOPB and CEAA public registries. The study team also contacted various fisheries stakeholders as shown in Table 3.1 of the EA Report early in the assessment process. No response required from BEPCo. The	Comment forwarded to CEA Agency. The timelines for the public review are in line with other reviews under the CEAA. The timelines were determined in consultation with the CEA Agency, EC and DFO. Notification was widely distributed province wide in local and regional newspapers. FAC members were directly notified. Also, notification was posted on CEAA's Public Registry, and the CNSOPB's website. The notice in the newspaper included a description of the location of the proposed project.

[1] Ecology Action Centre

COMMENT	PROPONENT'S RESPONSE	CNSOPB'S RESPONSE
- Ongoing awareness of how the operator will conduct operations on the water.[1]	advertisements for public review were not prepared by BEPCo. BEPCo did provide information on the project location to all fisheries groups that were contacted by the study team. Please refer to the following response	Inclusion of a map will be considered for future projects. Offshore activities and status of the activities are published weekly and posted to the CNSOPB's website.
How would BEPCo, or its sub-contractors, propose to "communicate directly with the N.C.N.S. Aboriginal Communal Commercial Fishery". The Native Council of Nova Scotia requested that the Board encourage BEPCo to establish with the Native Council of Nova Scotia a mechanism for direct communications about its fishery activities.[4]	As noted in Section 5.2.7 of the EA Report, BEPCo will initiate a communications plan with users of the local marine environment that may interact with the project. Communications with the NCNS Aboriginal Communal Commercial Fishery would fall within the scope of these communications. Generally, it is the intention of BEPCo to maintain a list of key contacts for fishing groups which may operate in the area and interact with drilling activities. Once more detail is known on the exact timing and nature of the MODU activities, representatives on this list will be contacted to ensure that all parties are aware of BEPCo's plans and opportunities to minimize any conflict are identified. This strategy will be particularly important as the EA Report addresses potential drilling activities over a five year period, and it is recognized that the nature of the fishing activity within the area of interest could change over time. In addition, BEPCo is committed to reviewing and verifying its EA Report on an annual basis (for those years during which drilling activities are planned) to ensure that the existing environment, mitigation and monitoring discussed in the EA Report are still valid.	The CNSOPB is satisfied with BEPCo's communication plan.
EAC reserves the right to make future comments on section 2.3.2 page 2-7 of the EA, and its four sub sets. We also anticipate that CNSOPB evolving	Comment noted.	The CNSOPB is participating in national initiatives to developing a Canadian standard for mitigation of seismic programs.

[1] Ecology Action Centre
[4] Native Council of Nova Scotia

COMMENT	PROPONENT'S RESPONSE	CNSOPB'S RESPONSE
guidance for seismic testing will continue.[1]		
Comments from fishermen are not being used to advise the outcome of the project or modify how it occurs. The project will go ahead regardless of input provided.[1]	Information on the public consultation program was provided in Section 3 of the EA Report. For this project, BEPCo decided early in the process to limit its area of drilling interest to depths of 1200 m and greater with the intent of limiting potential conflicts with commercial fishers.	Comments from the fisherman are always seriously considered. The CNSOPB has established the FAC to ensure fishing organizations are aware of, and have an opportunity to comment on, proposed activities.
There should be better communication on behalf of CEAA of the availability of participant funding. A press release of the funding on only the CEAA website was noted as not sufficient communication.[1] Request that the CNSOPB and CEAA work together to disseminate information to fisheries representatives through the FAC or another direct method to ensure all potential participants are aware of all aspects of the review process.[3]	No response required from BEPCo; this is a government-run process.	The CNSOPB has forwarded this comment to the CEA Agency. The CNSOPB has made a commitment to FAC members to ensure that they will be advised of future opportunities of participant funding.
Does BEPCo have an "Aboriginal Peoples" involvement corporate policy or guidelines for encouraging their involvement?[4]	BEPCo is committed to being an equal-opportunity employer. BEPCo respectfully notes that this comment falls outside the scope of the environmental assessment review process.	No response required from the CNSOPB.
Will the CNSOPB include in its CSR that the effective way to define and deal with project term effects and impacts on Aboriginal interests, ongoing needs, concerns and issues throughout the project term is best achieved directly between the Proponent and the Native Council of Nova Scotia under the umbrella of a protocol detailing the Proponent and Aboriginal role and responsibilities for ongoing consultation, cooperation and monitoring.[4]	BEPCo is committed to fulfilling all commitments made during the regulatory process; however, the requirement for a protocol for Aboriginal Peoples involvement is not necessary for this scope of project. The economic opportunities associated with a large development project, such as SOEP, are far greater than an exploration drilling project. With this in mind and with the potential for future production activities, BEPCo welcomes continued communication with the NCNS.	The CSR is required to address any effect of any change that the project may cause in the environment or the current use of lands and resources for traditional purposes by aboriginal persons. The aboriginal fishery is part of the commercial fishery, and the CNSOPB requires confirmation that there has been consultation with commercial fisheries prior to drilling activity authorization.

[1] Ecology Action Centre
[4] Native Council of Nova Scotia

COMMENT	PROPONENT'S RESPONSE	CNSOPB'S RESPONSE
ENVIRONMENTAL EFFECTS MONITORING		
Exploratory drilling to date in Canada has not been required to conduct EEM, although some operators have done so voluntarily. From the information assessed of three voluntary exploratory drilling EEM programs, they are not designed in scientifically rigorous ways. Has there been an analysis of the environmental effects of the 177 exploratory drilling programs in the offshore of Nova Scotia, by DFO, the CNSOPB, and EC?[1]	BEPCo is not aware of any comprehensive analysis of EEM results that has been undertaken by government. Several workshops have been held by DFO to discuss these issues as mentioned in the last paragraph of Section 7.2 of the EA Report.	To date the CNSOPB has not required EEM programs for exploratory drilling programs. The CNSOPB has required, and will continue to require, extensive EEM programs for development projects. DFO and EC both will provide advice on the design and review of these programs. It should be noted that the discharges and drilling process, for both exploratory and production wells are the same. In the case of development projects there are usually several wells drilled at the same location sequentially or sometimes concurrently.
Examples of problems with exploratory EEM programs to date were provided by the Ecology Action Centre. Deficiencies with three specific EEM programs (Encana H-08, Chevron H-23 Newburn, Marquis L-35) were discussed. Issues included the lack of pre-drilling baseline benthic surveys, and far field reference stations. Also, cutting piles observed during EEMs were not monitored after drilling to assess whether or not benthic communities had re-colonized or for the stability of the cuttings mound.	Comments noted. Appendix 4 of the addendum contains additional information on BEPCo's proposed EEM/follow-up program. No further response from BEPCo is required	Comments noted.
The recent Report of the Expert Panel on Science Issues Related to Oil and Gas Activities in Offshore British Columbia recommended chemical and biological monitoring of the following: potential and past drill sites and reference sites.[1] Recommend the same monitoring strategy for this	Appendix 4 of the addendum contains additional information on BEPCo's proposed EEM/follow-up program.	Please see Section 9.1.2 of this report for the EEM/follow-up program requirements for this project

[1] Ecology Action Centre
[4] Native Council of Nova Scotia

COMMENT	PROPONENT'S RESPONSE	CNSOPB'S RESPONSE
exploratory program. It is the EAC's understanding that no monitoring sites currently exist in the deepwater of the western Scotian Slope area.[1]	Though not yet published, 18 offshore exploration licences were sampled for chemical and biological characterization by Jacques Whitford. Thus, there is a database of information that Operators can access for drilling and/or post-drilling surveys. Many Operators have undertaken post-drilling surveys on a voluntary basis. It is the regulator's responsibility to make such programs mandatory.	
EEM Data should be in the public domain. The Norwegian regulatory authority established annual reviews of reports and the production of annual summary reports on the environmental condition around the Norwegian offshore installations. A similar public process should be initiated for Nova Scotia's offshore.[1] Will the CNSOPB place EEM data from offshore Nova Scotia drilling programs in the public domain?[1]	Recent changes to *CEAA* allow for results of follow-up to be publicly available. As of yet, it is unclear how this will be implemented in practice. No further response from BEPCo is required. BEPCo is not in a position to comment on the actions of regulators, although it supports EEM data being publicly available.	Results of BEPCo's EEM program will be in the public domain, as they are for all projects under the CEAA. See above response.
Limited information available that documented effects for multiple exploration wells to assess cumulative environmental effects. The CNSOPB, DFO, and EC, should take action on this data gap and design monitoring programs that can be used in these operations. [1]	BEPCo is not in a position to comment on the actions of regulators, although it is BEPCo's position that the proposed EEM/follow-up program as proposed in Appendix 4 of the addendum is sufficient for this project.	There is limited EEM data available for exploratory wells. However, for Development projects, a considerable amount of information exists. These projects represent a scenario that would have the most significant impact on the environment as there are usually several wells drilled at the same location sequentially or sometimes concurrently. Generally, impacts from the development wells have been found to be

[1] Ecology Action Centre

COMMENT	PROPONENT'S RESPONSE	CNSOPB'S RESPONSE
		short term and very localized.
Exploratory well sites don't necessarily dictate the location of a future appraisal / production well; monitoring plans should include future potential impact areas.[1]	Monitoring to verify EA predictions will be conducted at each drill site before and after the drilling of each well. Monitoring programs for production would be developed only if a production project was being proposed, and would be developed in consideration of the EEM results available from the drilling program.	The location of possible future appraisal and production wells is unknown at the present time, therefore it is impossible develop an efficient program to take these tentative wells into consideration.
Recommendation the following parameters as part of the EEM program: water quality, suspended particulate matter in the benthic boundary layer, sediment quality, benthic habitat and megafaunal community, air emissions, acoustic surveys, seismic effects on fish larvae, fish, and marine mammals.[1]	Appendix 4 of the addendum contains additional information on BEPCo's proposed EEM/follow-up program.	Please see Section 9.1.2 of this report for the EEM/follow-up program requirements for this project. As noted, the CNSOPB will require an EEM program to be submitted prior to the commencement of the drilling program.
Will DFO, EC, and the CNSOPB be implementing a scientifically rigorous EEM program for the deepwater of the western Scotian Slope that incorporates this project, and uses potential and past drill and control (or reference) sites?[1]		The CNSOPB will require an EEM program for this project. There is no plan to implement an EEM program for the deepwater of the western Scotian Slope at this time. If activities in this area were to significantly increase, then this may be a consideration. It is the CNSOPB's understanding that neither DFO nor EC have any intentions to implement such a program at this time.

[1] Ecology Action Centre

COMMENT	PROPONENT'S RESPONSE	CNSOPB'S RESPONSE
A monitoring program should be designed, with expertise from DFO and EC to monitor the drilling effects on the marine ecosystem. [1]	It is BEPCo's position that the proposed EEM/follow-up program as proposed in Appendix 4 of the addendum is sufficient for this project.	DFO and EC's expertise is always considered by the CNSOPB in EEM programs. The CNSOPB has MOUs with both Departments to address this issue.
BENEFITS		
While the Benefits Plan approval decision is made by the Board and is not required to be addressed in an EA, the issue of social and economic effects and impacts from an oil and gas resource development project is important to consider in the decision making process.[4]	Comment noted.	Comment noted.
Can the Board with the proponent satisfy our concerns and have addressed in the Benefits Plan and specifically identify in the CSR the social and economic effects and impacts on under represented groups and our community of Aboriginal Peoples in this oil and gas project? [4]	Comments regarding benefits planning are considered outside of the scope of the environmental assessment process and will not be addressed at this time. These comments will be taken into consideration as BEPCo prepares its Benefits Plan.	The purpose of the CSR is to assess the environmental impacts of the project and make a determination on whether or not these impacts are likely to be significant. This includes the impact on traditional aboriginal uses resulting from any change in the environment due to the project.
Will BEPCo and CNSOPB include provisions for the involvement of traditionally under-represented groups and Aboriginal Peoples in developing the "Benefits Plan" this project?[4]	Comments regarding benefits planning are considered outside of the scope of the environmental assessment process and will not be addressed at this time. These comments will be taken into consideration as BEPCo prepares its Benefits Plan.	Comments noted.
OTHER COMMENTS		
The EA was difficult to read and understand. It would be helpful if it contained a brief 2 page summary of project area, impacts, and proposed monitoring. It is recommended that a non-technical	Comment acknowledged.	Comment noted.

[4] Native Council of Nova Scotia

COMMENT	PROPONENT'S RESPONSE	CNSOPB'S RESPONSE
summary should precede the more technical sections of the Environmental Statement.[1]		
There is a lack of peer review of the science, for example this could be done by the academic community.[1]	The preparation of the EA followed accepted procedures and was provided to both DFO and EC for review as expert federal authorities.	The Science is reviewed by the CNSOPB, as well as by the expert Federal Departments (DFO and EC).
Section 16.1 of the recently amended CEAA, gives responsible authorities conducting an EA the discretion to consider community and Aboriginal traditional knowledge. This EA has not incorporated the considerable marine ecological knowledge held by fishers. Limited consultation was conducted with fishers in the development phase of the EA. [1]	The approach to stakeholder consultation adapted by the study team was discussed with and approved by the CNSOPB early in the scoping process. It is BEPCo's position that the consultation undertaken for this EA is sufficient to determine the likelihood of significant adverse effects to result from the project.	The proponent consulted with associations of users of the area as well as DFO. The CNSOPB has determined that sufficient consultation and information was collected to make a determination on the significance of any environmental impact.
Can the proponent confirm that it does intend to establish or continue a "permanent exclusion zone" for each exploratory well following its abandonment.[4]	The safety zone will be implemented to exclude vessel traffic within a 500 m radius of the rig during drilling operations only and will not be in place following well abandonment. If the rig is anchored, the zone will be drawn at 50 m from the anchor pattern, if this area is greater than the 500 m radius. Again the zone would only be in place during drilling operations. BEPCo will not establish any "permanent exclusion zones" for this project.	The CNSOPB will ensure that the location of the wellhead is placed on nautical charts. There will be no exclusion zone after the drilling operation is complete.
Install monitors for hydrogen sulfide; set to activate at concentration levels of H_2S exceed 7 mg/m 3 (5 ppm).[1]	Monitors on the MODU will comply with appropriate occupational heath and safety requirements.	Hydrogen Sulfide monitors will be required to satisfy the CNSOPB's regulations.
In light of the potential effects drilling has been shown to have on benthic organisms and marine fish, Canada should set the highest offshore environmental standards. In August of 2004, the Norwegian government announced the implementation of a program to achieve zero environmentally hazardous discharges to the sea by	BEPCo will comply with all applicable regulations and all conditions of their approval. No further response is required from BEPCo.	The CNSOPB is responsible for the regulation of oil and gas activities offshore Nova Scotia. The Offshore Waste Treatment Guidelines (2002) were developed by the CNSOPB, the National Energy Board and the Canada- Newfoundland Offshore Petroleum Board in consultation with EC, DFO and the public. Also, the CNSOPB will

[1] Ecology Action Centre
[4] Native Council of Nova Scotia
[1] Ecology Action Centre

COMMENT	PROPONENT'S RESPONSE	CNSOPB'S RESPONSE
the end of 2005.[1] Will the CNSOPB, EC, and the DFO declare a zero emissions tolerance to the marine environment for oil and gas operations in Canada?[1]		require BEPCo to adhere the Offshore Chemical Selection Guideline. In the CNSOPB's opinion, for the location of the proposed project, adherence to these guidelines is sufficient to protect the environment.
This EA illustrates the need for the adoption of WWF- Canada's *Conservation First* principle, which requires that conservation steps be sequenced in advance of development while the option still exists. A regional-scale, systematic approach to conservation planning is required to protect biodiversity on the Scotian Shelf. Such an approach will lead to the establishment of a network of MPAs . The proactive establishment of such a network would clearly set out where exploration activities would not be permitted and thus allow for long-term planning within the offshore petroleum sector. Proceeding with the proposed drilling program will impinge upon the ability to complete a network of MPAs that would help conserve biodiversity, sustain fisheries and secure a diversified economy in the region.[2]	This comments falls outside the scope of the environmental assessment process; therefore, no additional response is required from BEPCo.	The CNSOPB is participating with DFO in the ESSIM initiative to advance a regional-scale integrated management plan. During the preparation of this plan, the various users of the ocean continue to be regulated under the existing regimes.

[2] World Wildlife Fund

APPENDIX C

The following report was provided by the Department of Fisheries and Oceans at the request of the CNSOPB and reviewed by the Board in the preparation of this Comprehensive Study Report

INFORMATION ON HADDOCK WITHIN THE HADDOCK BOX

Haddock on the Scotian Shelf are managed as two stocks: 4X Haddock and 4TVW Haddock. The 4TVW Haddock stock extends from Emerald Bank to the Laurentian Channel, though it tends to be concentrated on the western portion of this range (west of Banquereau).

4TVW Haddock fishery has historically been conducted on the offshore banks during late winter and early spring, which is when haddock move onto the banks to spawn in dense aggregations. A year-round mobile gear closure of the Haddock Box was implemented in 1987 to protect juveniles and in 1993 the area was closed to all fishing activity. Since 1994, the cod and haddock fishery in 4VW has been under moratorium and there has been no directed fishing for haddock even outside of the Haddock Box, though haddock are captured incidentally as by-catch in the open fisheries in 4VW.

Eggs/Larvae
Haddock spawning within the Haddock Box begins in March-April and ends in May-June, with peak spawning in March/April. Eggs are released near the bottom and rise to the surface due to their positive buoyancy. The density of the eggs increases with time, and during an average incubation period of two weeks they descend to approximately 30m. Once hatched, haddock larvae feed on surface plankton and gradually descend to the bottom as juveniles in mid-summer (Figure 1).

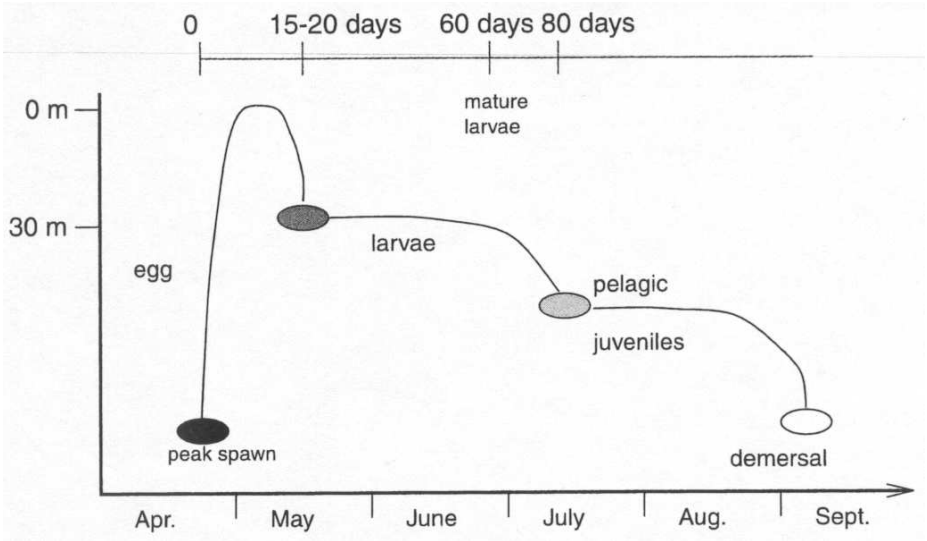


Figure 1. Conceptual life-stage model showing the progression from eggs to juveniles. (Brickman and Frank 2000)

Information on the distribution of haddock eggs and larvae on the Scotian Shelf was compiled by Hanke et al. (2001). The most relevant information on eggs/larvae within the Haddock Box was collect during the Scotian Shelf Ichthyoplankton Program from 1976-1982. A sample map of egg distribution in April (Figure 2) and larvae distribution in May (Figure 3) is provided below. Note

that these maps present averaged data over the years sampled and do not adequately portray the consistency of egg and larval abundance within the Haddock Box from year to year.

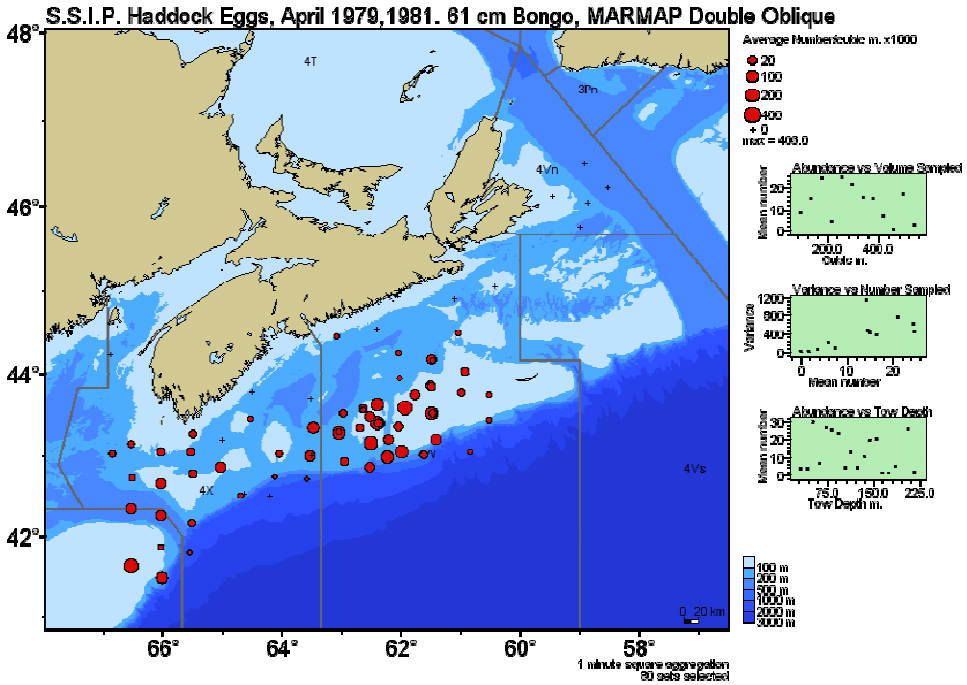


Figure 2. Distribution of haddock eggs from SSIP data, April 1979 and 1981.

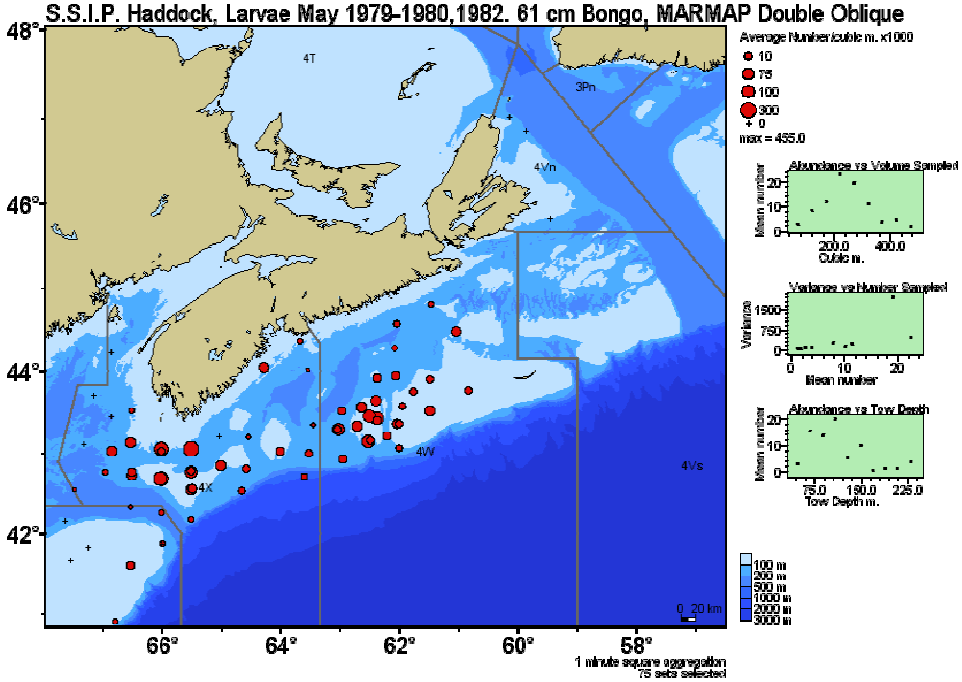


Figure 3. Distribution of haddock larvae from SSIP data, May 1979, 1980 and 1982.

Juveniles

Pelagic juvenile haddock (<8cm) feed primarily on copepods and euphausids, while benthic juveniles (>8cm) feed on benthic amphipods, polychaetes, etc. (Methven 1999). Demersal juvenile

haddock seem to prefer sand/gravel substrate (Brickman 2001), though studies are currently being undertaken by DFO to more accurately characterize haddock habitat preference.

The boundaries of the Haddock Box were initially designed to encompass the high concentrations of young haddock in this area that were consistently observed by research vessel surveys (Fanning et al. 1987). Analysis of juvenile haddock distribution after the closure (Frank et al. 2000) indicated two centers of distribution. The first appears to be centered over Emerald Bank (Figure 4:A) and is contained within the Haddock Box. The second occurs just to the east of the Haddock Box boundary (Figure 4:B).

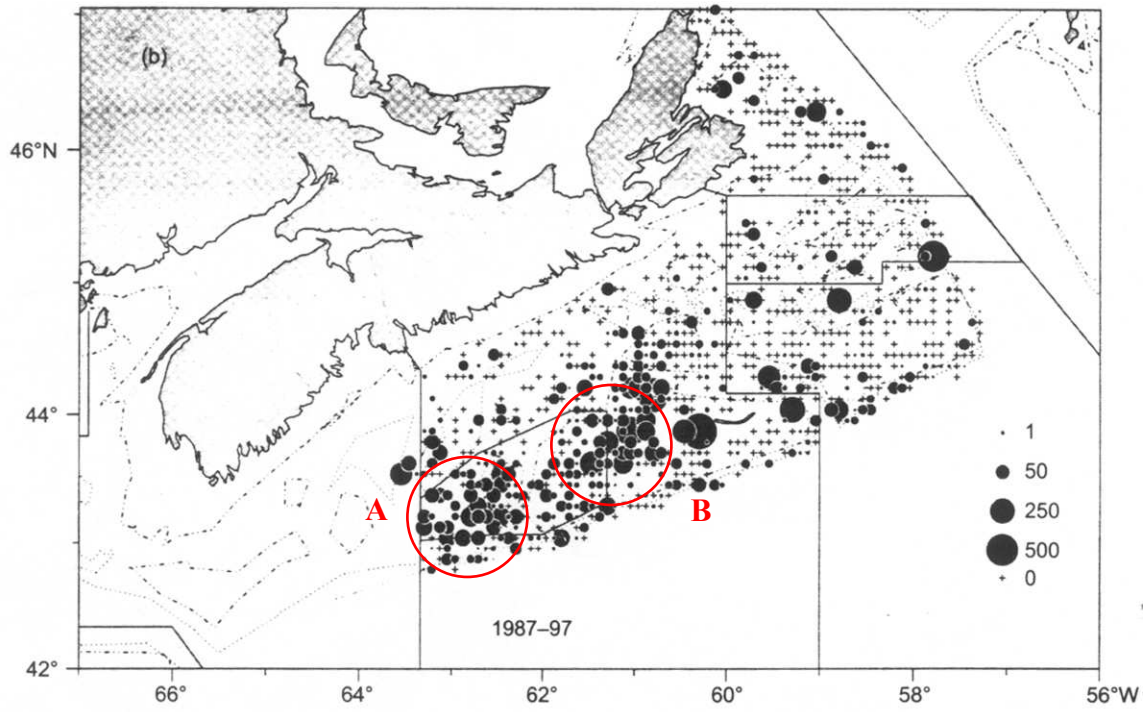


Figure 4. Post-closure distribution of juvenile haddock (ages 1 and 2 combined) based on July research survey data. (Frank et al. 2000)

Analysis of March and July groundfish survey data from 2001-2004 indicate that the Haddock Box remains an important area for juveniles in March, and aggregations to the east of the Haddock Box continue to occur in July. In July 2004, however, haddock appeared to be concentrated on Emerald Bank.

An evaluation of the effectiveness of the Haddock Box conducted by Frank et al. (2000) determined that recruitment and juvenile survival had not increased since the closure was implemented. However, it was felt that this was likely due to the decline in the condition of the stock as a whole and not necessarily due to the design of the closure.

Adults

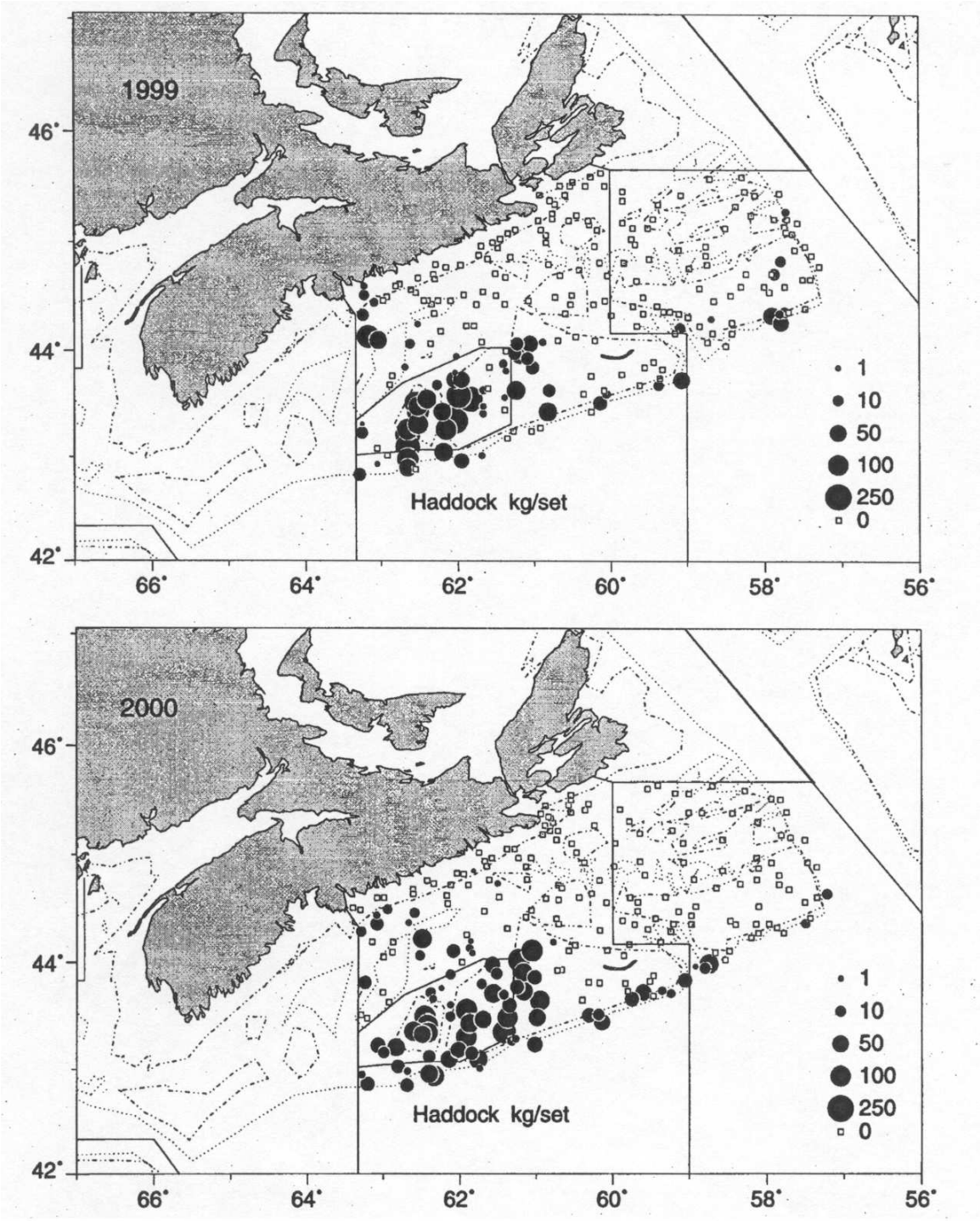
Haddock grow at a rate of 5-10 cm per year, become sexually mature at 3-5 years and are relatively long-lived (>10 years). Adults eat bottom dwelling organisms, such as molluscs, crustaceans, starfish, worms, fish eggs, sand lance, capelin, silver hake, herring, juvenile eels (Scott and Scott 1988).

Since the early 1980's, haddock in this region have demonstrated poor growth, early maturation, low condition and high natural mortality. While abundance of adults has increased in recent years, this is mostly due to individuals less than 42cm. Abundance of large haddock (>42cm) remains low (DFO 2001).

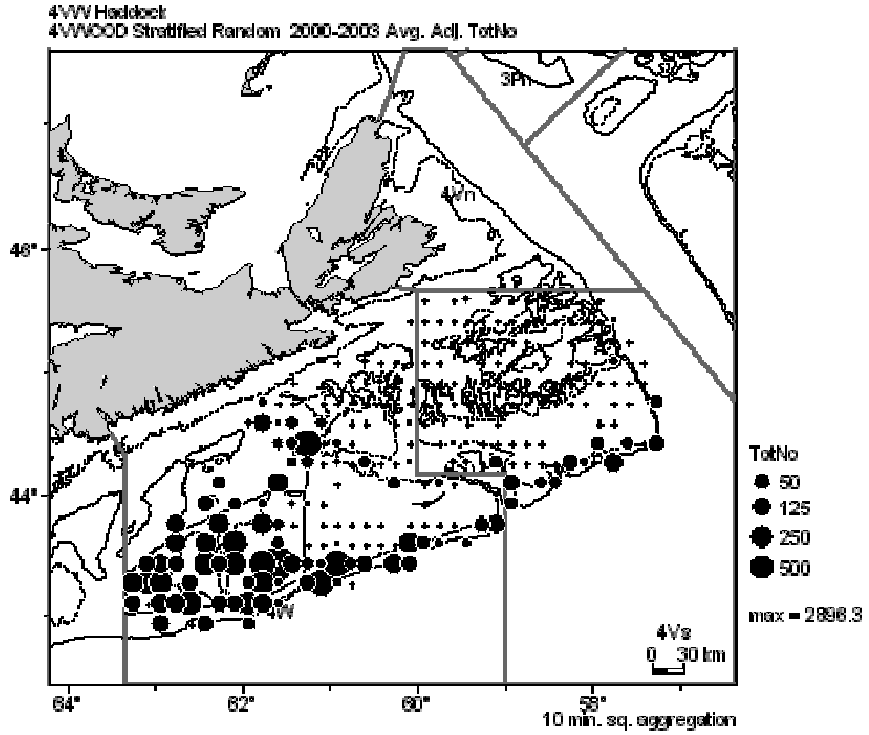
Adult 4TVW Haddock are concentrated within the Haddock Box (Table 1) year round, as indicated by the fall sentinel survey, the March RV survey, and the July RV survey (Figure 5).

1995	1996	1997	1998	1999	2000
69%	59%	71%	86%	68%	53%

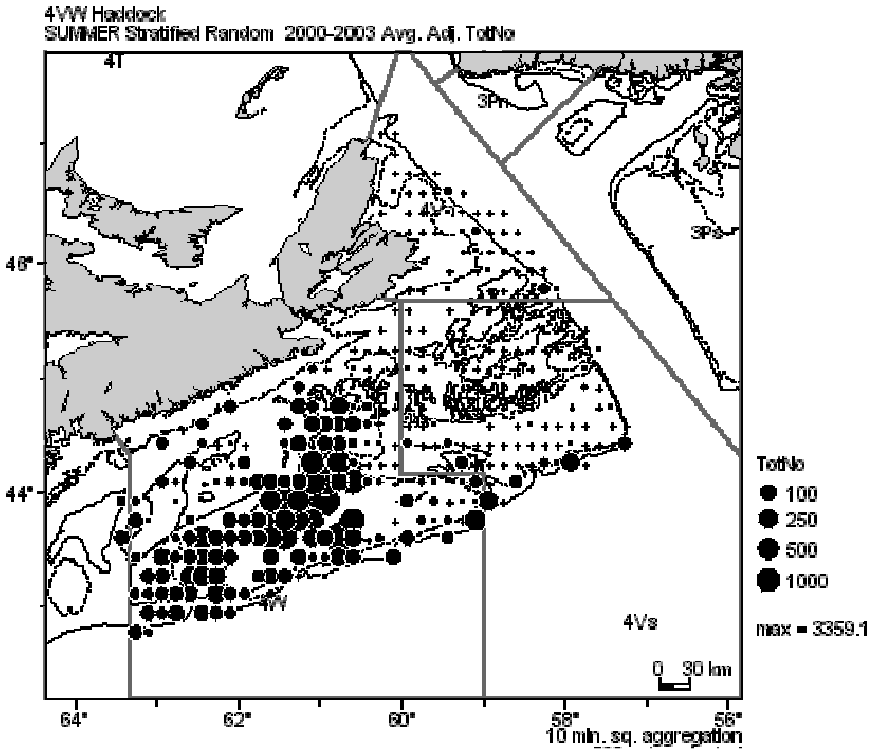
Table 1. Annual % of haddock inside the haddock box based on industry surveys. (Frank et al. 2001)



a) Fall sentinel survey (Frank et al. 2001)



b) March RV survey



c) July RV survey

Figure 5. Haddock catch in a) the fall sentinel survey (1999, 2000), b) the March RV survey (2000-2003), and c) the July RV survey (2000-2003).

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